DESIGN AND DEVELOPMENT OF E-LEARNING SOLUTIONS IN LIBRARY AND INFORMATION SCIENCE

THESIS

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BY

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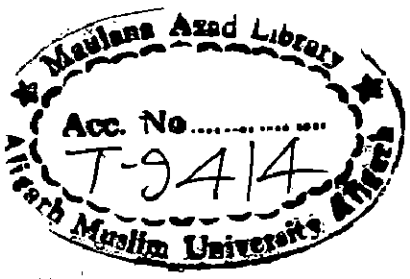
THESIS



Dedicated

To

My Loving Parents

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Certificate

This is to certify that the thesis entitled **"Design and Development of E-Learning Solutions in Library and Information Science"**, submitted by ***Mr. Sheikh Mohd Imran*** for the award of the degree of Doctor of Philosophy in Library and Information Science, is based on the research work carried out by him under my guidance and supervision.

To the best of my knowledge, this work has not been submitted in any University or Institution for the award of any degree.

(Dr. Naushad Ali P.M) 26.9.14

DECLARATION

I, Sheikh Mohd Imran, do hereby declare that the thesis **"Design and Development of E-Learning Solutions in Library and Information Science"** submitted for the award of degree of Doctor of Philosophy in Library and Information Science is original and based on my individual research effort, and the thesis has not been presented for the award of any other degree or diploma in any university or institution, and that all the sources used in this research effort have been comprehensively acknowledged.

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PREFACE

This thesis represents a culmination of work and learning that has taken place over a period of my research. The thesis highlights the developments of Library and Information Science education from early times to modern digital era whereby learning takes place virtually in an online environment. The latest developments are the outcome of the widespread application of Information and Communication Technology (ICT) in higher education system. ICT has revolutionized the way of teaching and learning and has given rise to various movements and initiatives in e-learning.

The present study is an effort to highlight the use of e-leaning systems by various universities across India and the satisfaction of students and e-learning proficient staff members. Moreover, the expertise of e-learning proficient staff in managing the overall integrated e-learning systems has also been described. The present research is perhaps the first of its kind that focuses on the top most universities in India and describes various experiences of e-learning proficient staff members and students and the softwares used in the universities under study.

There is a need to develop an e-learning system in LIS education and after evaluating some of the select well known web-based e-learning system which provides free access to professionals, teachers and students, an e-learning prototype has been designed. It is an attempt to subside the shortage of contact class programmes due to the phenomenal growth in the number of students. The proposed prototype will expand the possibilities of improving professional caliber and quality of education in Library and Information Science.

Based on the study and remarks from the faculty members and participants, some suggestions have been put forward for the further improvement of the development and scope of study in the country. The thesis has been divided into seven chapters and appended a comprehensive bibliography and questionnaires under appendices.

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(Sheikh Mohd Imran)

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Abbreviations Used

AACR	Anglo American Cataloguing Rules
ACE	American Council on Education
ADL	Advanced Distributed Learning
AICC	Aviation Industry Computer-based Training committee
ALE	Application Linking and Enabling
ALISE	Association of Library and Information Science Education
AMS	American Mathematical Society
AMU	Aligarh Muslim University
API	Associate Partner Institutions
API	Application Programming Interface
ASP	Active Server Pages
AU	Amity University
BIT	Birla Institute of Technology
BLOB	Binary Large Object
CAGR	Compound Annual Growth Rate
CAL	Computer Assisted Learning
CAP	Country Areas Program
CBL	Computer Based Learning
CCF	Common Communication Format
CD-ROM	Compact Disc Read Only Memory
CDS	Central Depository System
CEC	Consortium for Educational Communication
CLE	Collaboration and Learning Environment
CMS	Content Management System
CPM	Critical Path Method
CSCL	Computer Supported Collaborative Learning
CSHE	Center for Studies in Higher Education
CSV	Cluster Shared Volumes
DBU	Don Bosco University
DLLE	Department of Lifelong Learning and Education
DRTC	Documentation Research and Training Centre
DSL	Digital Subscriber Line
DST	Department of Science and Technology
DTH	Direct To Home
DU	Delhi University
DVD	Digital Video Display
EDI	Electronic Data Interchange
ELP	E-learning platform
E-mail	Electronic Mail
EMB	Education and Manpower Bureau
EMMRC	Educational Multimedia Research Centre
ERP	Enterprise Resource Planning
ETD	Electronic Theses and Dissertations

FAQ	Frequently Asked Questions
FTP	File Transfer Protocol
GOU	Global Open University
GPL	General Public License
GUI	Graphical User Interface
GSL	Greek sign language
HCI	Human Computer Interface
HCM	Human Capital Management
HTML	Hypertext Markup Language
IBM	International Business Machine
ICT	Information Communication Technology
ICAI	Institute of Chartered Accountants of India
ICFAI	Institute of Chartered Financial Analysts of India
ICSI	Institute of Company Secretaries of India
ICWAI	Institute of Cost and Works Accountants of India
ID	Instructional Design
IDC	International Data Corporation
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IGNOU	Indira Gandhi National Open University
IIM	Indian Institute of Management
INTEND	Indian Training and Education Network for Development
IIPM	Indian Institute of Petroleum Management
IIT	Indian Institute of Technology
ILIAS	Integrated Learning Information and Work Cooperation System
ILT	Information and Learning Technology
INFONET	Information Network
IO	IGNOU Online
IPR	Intellectual Property Rights
ISO	International Organization for Standardization
ISPs	Internet Service Providers
ISRO	Indian Space Research Organization
IT	Information Technology
ITS	Intelligent Tutoring Systems
JAD	Joint Application Development
JPEG	Joint Photographic Experts Group
KU	Kashmir University
LAMS	Learning Activity Management System
LAN	Local Area Network
LCMS	Learning Content Management System
LDAP	Lightweight Directory Access Protocol
LIS	Library and Information Science
LIVE	Library and Information Virtual Education
LL	LIS Learn
LMS	Learning Management System

LOM	Learning Object Metadata
LOR	Learning Object Repository
Mbps	Mega Bits Per Second
MELCOE	Macquarie E-learning Centre of Excellence
MHRD	Ministry of Human Resource Development
MLIS	Master in Library and Information Science
MOODLE	Modular Object-Oriented Dynamic Learning Environment
MoU	Memorandum of Understanding
MS	Microsoft
MU	Mumbai University
MySQL	My Structured Query Language
NACOL	North American Council for Online Learning
NCERT	National Council on Educational Research and Training
NEHU	North Eastern Hill University
NGO	Non Governmental Organizations
NISO	National Information Standards Organization
NIT	National Institute of Technology
NME-ICT	National Mission on Education-Information and Communication Technology
NODLINET	National Open and Distance Learners' Library and Information Network
NPTEL	National Programme on Technology Enhanced Learning
OAR	Open Access Resources
OCW	Open Course Ware
ODBC	Open Database Connectivity
ODL	Open and Distance Learning
ODLIS	Online Dictionary for Library and Information Science
OECD	Organization for Economic Co-operation and Development
OLAT	Online Learning and Training
OLT	Office of Learning Technologies
OOP	Object Oriented Programming
OSCAR	Open Source Educational Resources Animation Repository
OPAC	On-line Public Access Catalogue
PCs	Personal Computers
PDF	Portable Document Format
PERT	Project Evaluation and Review Technique
PhD	Doctor of Philosophy
PHP	Personal Home Page
QBE	Query-by-example
RAD	Rapid Application Development
R&D	Research and Development
RAM	Random Access Memory
RDBMS	Relational Database Management System
RDF	Resource Description Framework
RIOs	Reusable Information Objects
RLOs	Reusable Learning Objects

ROI	Return On Investment
RSS	Really Simple Syndication
SCORM	Sharable Content Object Reference Model
SDLC	System Development Life Cycle
SGML	Standard Generalized Mark Language
SIGIT	Subject Information Gateway in Information Technology
SIU	Symbiosis International University
SMEs	Subject Matter Experts
SMS	Short Message Service
SOA	Service Oriented Architecture
SOAP	Simple Object Access Protocol
SUNY	State University of New York
SWF	Shock Wave flash
TB	Tera Byte
TCP/IP	Transmission Control Protocol/ Internet Protocol
TEI	Teacher Education Institutions
TFT	Thin Film Transistor
UC	University of California
UGC	University Grants Commission
UK	United Kingdom
UMTS	Universal Mobile Telecommunications System
UNESCO	United Nations Educational Scientific and Cultural Organization
URL	Uniform Resource Locator
US	United States
USA	United States of America
VAX	Virtual Address Extension
VCTEL	Virtual Centre for Technology Enhanced Learning
VET	Vocational Education and Training
VICES	Virtual Instructional Classroom Environment in Science
VLE	Virtual Learning Environment
VSAT	Very Small Aperture Terminal
WBT	Web Based Training
WCET	Western Cooperative for Educational Telecommunication
WebCT	Web Course Tools
WebDAV	Web Distributed Authoring and Versioning
Wi-Fi	Wireless Fidelity
Wi-MAX	Worldwide Interoperability for Microwave Access
WISE	Web-based Information Science Education
WWW	World Wide Web
WYSIWYG	What You See Is What You Get
XML	Extensible Markup Language

Chapter-1

Introduction

CHAPTER-1
INTRODUCTION

"The man who can make hard things easy is the educator."

~Ralph W. Emerson (1803-1882)

Significant advances in the application of Information and Communication Technologies (ICTs) have become so attached to contemporary educational delivery worldwide that it has virtually become impossible to deliver or receive formal education without the application of such advanced technologies in the processes. The technology has made it possible to develop online virtual lab system to support remote and distance learning courses that require a laboratory component where internet-based control laboratory experiments such as measurement, monitoring and control applications can be accessed remotely. In line with this fact, higher educational establishments in particular have dramatically transformed their mode of operation. Today, the use of chalk and duster in seminar rooms and lecture theatres are completely extinct on some campuses. In place of that, interactive whiteboards powered by computers and projectors, learning management systems etc. came into vogue. E-learning has emerged and progressed drastically with the development of the internet and Information and Communication Technologies.

Although the term 'E-learning' may be a fairly recent addition to the English vocabulary, the concept of learning through electronic media is not a new one to the society. Since the adoption of International Business Machine (IBM) PC standard and the invention of the Apple Macintosh in the early 1980s, computers have been used for teaching and learning, initially in the delivering multiple choice questions in a 'drill and practice' environment, then moving on to more sophisticated Computer Based Learning (CBL) packages which involve text, simple graphics and interaction.

1.1 E-Learning Concept

Electronic learning mediums referred to as e-learning is increasingly becoming the established practice with a wide array of positive outcomes. Over the past

decade, e-learning, has moved from being a sheer project on the periphery to a central and integral part of some higher education operations. In fact, for some institutions it has become such an integral part of the institution that their institutional goals are reflected in their strategic plans and policies (Ellis, et. al, 2007). E-Learning means a lot of different things and it is understood differently by players with very different roles. The E-Content Report (2004)[1] describes e-learning as "an umbrella term describing any type of learning that depends on or is enhanced by electronic communication using the latest Information and Communication Technologies (ICT)." It is also known as a generic term covering a wide set of ICT based applications and processes, including web-based learning, computer-based learning, virtual classrooms, digital collaboration and networking. Many institutions of higher education, educational organizations, the business community, and learners are embracing e-learning for a variety of reasons and needs. Knowledge seekers no longer need to wait for information, training or instruction. Expectations of where we learn, when we learn and how we learn have shifted from the formal training and classroom environment to an online, any time, connected network of learning (Siemens, 2006).

The popularity associated with this transformation is due in part to the recognized opportunities e-learning offers, such as increased accessibility to non-traditional students, a learning format that offers greater flexibility to students, and the increased capability of offering a "social presence" to connect students despite the physical distance between them (Elsenheimer, 2006). Digital access and digital learner changed the nature of knowledge itself because in the connected world, experts are people who know where to find information, how to make sense of it and what to do with it.

Reports on workplace practices from government and private sector concur and stress the need for new environments that provide just-in-time support and allow workers to assume greater responsibility for their own, independent

1. E-Content Report by ACTeN (www.acten.net) August 2004 (URL: talkingobjects.files.wordpress.com/2011/08/jak-boumans-report.pdf)

learning and skill development (King, 2001). It refers to the key factors such as flexibility, using mixed interactive multimedia, internet research, archiving, electronic networks, telecommunications, and cost to support the idea that e-learning could serve as a viable and qualitative learning alternative.

1.2 E-Learning: Brief History

E-learning is described as fourth generation distance teaching, virtual campus, virtual teaching, flexible learning model, etc. It involved the application of two-way communication. Added to all the developments, ICT supported education quickly became the hot topic in the 1990's due to spreading use of the World Wide Web and its fast developing applications.

Early E-Learning systems based on Computer-Based Learning/Training often attempted to replicate despotic teaching styles whereby the role of the e-learning system was assumed to be for transferring knowledge, as contrasting to systems developed later based on Computer Supported Collaborative Learning (CSCL), which encouraged the shared development of knowledge. As early as 1993, Graziadei, W. D. described an online computer-delivered lecture, tutorial and assessment project using electronic Mail, two VAX Notes conferences and Gopher/Lynx together with several software programs that allowed students and instructor to create a Virtual Instructional Classroom Environment in Science (VICES) in Research, Education, Service & Teaching (REST). In 1997 Graziadei, et al. published an article entitled "Building Asynchronous and Synchronous Teaching-Learning Environments: Exploring a Course/Classroom Management System Solution". They described a process at the State University of New York of evaluating products and developing an overall strategy for technology-based course development and management in teaching and learning. The product(s) had to be easy to use and maintain, portable, replicable, scalable, and immediately affordable, and they had to have a high probability of success with long-term cost-effectiveness. Today many technologies can be, and are, used in e-Learning, from blogs to collaborative software, e-Portfolios, and virtual classrooms. Most e-Learning situations use combinations of these techniques.

According to Anderson (2004), E-learning can take place in two modes, synchronous and asynchronous:

(i) *Synchronous e-learning*:

It is a computer assisted learning environment, where the instructor and the learners are involved in course, class or lesson at the same time e.g. web conferencing, audio/video conferencing.

(ii) *Asynchronous e-learning*:

It is a computer assisted learning environment, where the instructor and the learners are in the course, class or lesson at different times (not synchronized) e.g. bulletin boards, blogs, and e-mail list servers.

In the recent years, the e-learning systems commonly used were e-mail, computer conferencing and/or newsgroups. Unfortunately, these generic systems were not very well suited to support educational activities as they produced significant burden on the user, lacked support for instructional activities and learning strategies such as knowledge building and multiple representations of ideas and knowledge structures. Eventually these outdated systems gave way to the more popular Learning Management Systems (LMS's) and Content Management Systems (CMS's) that we see today such as WebCT, Blackboard and Modular Object-Oriented Dynamic Learning Environment, (Moodle), Joomla etc. and now these systems have proliferated throughout the academic arena.

In Library and Information Science education, there has been a significant change because ICT has increased the momentum for change in traditional concepts of teaching and learning, as well as prime motivation behind the change in scholarly and professional activities. Library and Information Science (LIS) academic departments witnessed such changes and this environment has made it important for LIS Education and Training to strive to improve their quality of programmes, on the one hand to be able to participate in educational networks and develop innovative strategies in planning and administration of LIS education and on the other hand, to produce graduates whose workplace spans the whole world.

1.3 Historical Development of Library and Information Science Education

The growth of Library and Information Science education in India can be traced back in 1911 when an American disciple of Melvil Dewey named W.A.Borden for the first time started a short term training programme in Library Science at Central Library Baroda (Singh, 2003). Later in 1915, the then librarian of Punjab University Lahore (now Pakistan) Asa Don Dickinson (1876-1960) started three months apprentice training programme for working librarians and this training schools is the second known library school in the world; the first being the Ranganathan Columbia School. Dickenson was probably the first to use the term 'Library Science' for his training course in place of 'Librarianship' (Naushad & Samar, 2006). In 1929, Dr. S.R.Ranganathan, father of Library Science in India, started a certificate course in Madras University and in the year 1937, the course was converted into a post-graduate diploma in Library Science.

University of Delhi has the credit of being the first university to establish a full-fledged Department of Library and Information Science in 1946. The diploma course was changed to Master in Library Science (M.Lib.Sc) in 1951 and it is the first university to offer M.Phil and Ph.D Degree in Library Science. Between 1956 to1959, six new LIS departments were established at Aligarh Muslim University, M.S.University of Baroda, Nagpur University, Osmania University, Pune University and Vikram University (Mangla, 1998). Since 1960's, the number of LIS departments established has continued to increase.

Later in 1980s, LIS education through distance mode was started in Andhra Pradesh Open University and it was a great success. Many other universities like Madras University, Madurai Kamaraj University and Annamalai University launched their BLIS, MLIS and M.Phil degrees for distance learners and employed people due to the emerging information management systems and ICT developments in Library and Information Science (Kawatra & Singh, 2006). Later on, IGNOU also offered LIS courses through distance mode and today we can see various online leaning portals and

content development portals have been developed throughout the country which provides Library and Information Science education with modern ICT enabled systems.

There has been a historical development in taking the education to higher levels using latest ICT enables tools and technology in India and for this reason, the National Task Force on Information Technology and Software Development was constituted by the then Prime Minister of India in 1998. Various National level initiatives have been taken by the University Grants Commission (UGC) and the Ministry of Human Resource Development (MHRD), Government of India in this perspective (Mishra, 2009).

In order to promote technology driven education, a dedicated education satellite EDUSAT was launched on September 20, 2004 to bring in qualitative and quantitative revolution in e-learning. Government also came with the idea of effective use of ICTs in education in its Eleventh five year plan (2007-2012) and set up a National Mission in Education through ICT (NME-ICT) (Thakur. Kumar & Pallavi, 2013). Presently, several projects are in operation to promote education in the field of Library and Information Science and other areas of knowledge. Some of the major projects are eGyanKosh, Flexilearn, NPTEL, CEC, Institute of Lifelong Learning (ILLL), e-PGPathshala. Thus, it is an inevitable truth that ICT is momentous in the achievement of LIS educational goals and objectives through e-learning and the fulfillment of the primary tasks of LIS schools.

Recent educational statistics and forecasts also revealed that e-learning is gaining ground in colleges, universities and institutions of higher education. Investigating and assessing the planning and implementation process of e-learning courses and programs at the institutions of higher education is necessary to determine the quality of e-learning environment. Quality e-learning is a web-based learning environment designed, developed, and delivered based on several principles, such as institutional support, course development, teaching/learning, course structure, student support, faculty support, and evaluation and assessment (Phipps & Merisotis, 2000). Ensuring a

quality e-learning environment is essential to provide students with the full range of benefits that e-learning entails. E-learning is a specific type of education that when combined with other means of learning delivery expands the capability, reach, and frequency of learning. Most e-learning programs include a computer-based training system, electronic text, images, e-mails, video conferencing, audio conferencing, and communication tools to produce a vital classroom. As Internet and World Wide Web are accessible from virtually all computer platforms, they serve as a foundation for many e-learning systems.

E-learning provides unprecedented availability, response time, and scalability to learning systems. While many institutions have chosen to embrace web-based instruction, obstacles, whether expectedly or unexpectedly, have threatened the viability and effectiveness of e-learning. Such obstacles include "exorbitant amounts of time" needed for faculty to design effective learning content, the "cost of quality assurance", and the need for faculty "training and support" (Husson & Waterman, 2002). But, Open Source Softwares like Joomla, Dokeos, Adobe green, Claroline, ILIAS, Sakai, OLAT, Fle3 and MOODLE etc. have, in a way, tried to overcome these obstacles by eliminating the designing time for institutions and by reducing the costs in quality assurance. One such open source software is 'Joomla', which is used by the investigator for designing of an e-learning prototype. Joomla is a Content Management System (CMS) - a software package designed to help educators create quality online courses and manage learner outcomes. Such e-learning systems are sometimes also called Learning Management Systems (LMS), Virtual Learning Environments (VLE) and Learning Content Management Systems (LCMS). Joomla is an open source software, which means we are free to download it, use it, modify it and even distribute it (under the terms of the GNU General Public License). Joomla runs without any modification on Unix, Linux, Windows, Mac OS X, Netware and any other system that supports PHP, including most web host providers. Data is stored in a single database: MySQL and uses object oriented programming (OOP) techniques and includes features such as page caching, RSS feeds, printable

versions of pages, news flashes, blogs, polls, search, and support for language internationalization.

The Internet and the combination of cognitive task analysis, activity theory, and information technology is advancement in knowledge will identify new ways to view learning and develop new paradigms for the world, now and in future.

Keeping that perspective in mind, the investigator tried to understand the applications and utilization of e-learning system in the country, especially in the field of Library and Information Science.

An evaluation of the existing select e-learning systems is done to know about the objectivity, coverage, effectiveness and suitability of online learning delivery systems so as to perceive the new possibilities because of e-learning and design and develop an e-learning prototype that will expand the possibilities of improving professional caliber and quality of education in Library and Information Science. The study will be helpful for future researchers and students to foothold their knowledge base and will provide roadmap in guiding them in the areas of e-learning that impinge their interests.

1.4 Statement of Problem

The study undertaken entitled ***"Design and Development of E-learning Solutions in Library and Information Science"*** is an initiative to bring together all the library and information science professional community on one platform, so that they can share their valuable expertise, ideas and views. The prototype of an e-learning portal envisages a space for teachers and other professionals to express their thoughts on any subject that touches their professional lives. It also involves the uploading of material and content created by and for library professionals in English language.

The e-learning market is booming up world over and is predicted to follow an upward swing with more and more institutions, organizations and individuals implementing and adapting to this mode. The power of e-learning lies in its potential to provide the right information to the right people at the right time and place irrespective of any geographical or physical boundaries.

There is a lack of full-fledged E-learning system in Library and Information Science. Here is the need to develop an e-learning system in LIS education after evaluating some of the select well known web-based e-learning systems, which provides free access to professionals, teachers and students. It is an attempt to subside the shortage of contact class programmes due to the phenomenal growth in the number of students. LIS learners of distance mode do not have sufficient exposure on the subject.

1.4.1 Definition of Research Terms

Design:

Oxford English Dictionary (2012) defines 'Design' as the art or action of conceiving of and producing a plan or drawing of something before it is mad. Design is the systematic development of instructional specifications using learning and instructional theory to ensure the quality of instruction (Berger & Kam, 1996). It is the entire process of analysis of learning needs and goals and the development of a delivery system to meet those needs. It includes development of instructional materials and activities; and tryout and evaluation of all instruction and learner activities. Content, discussions, interactions, etc. can all be evaluated and reviewed by persons other than the instructor (Molenda, Reigeluth & Nelson, 2003). It seeks to ensure that critical concepts are explored through content presentation and learning activities. The resulting benefits - reduced design costs, consistent look and feel, transparency, quality control, standardization - make organizational investment in Instructional Design (ID) a simple decision.

Development:

Merriam Webster Dictionary (2012a) defines 'Development' as the state of being created or made more advanced.

E-Learning development is the use of digital technology to empower and enhance learning and training (San Francisco State University, 2007). The development of e-learning focuses on identifying subject matter experts, creating the development timeline, exploring skill sets needed for completing the project, and doing the actual work of creating the learning.

E-Learning:

MacMillan Dictionary Thesaurus (2012) defines "E-Learning as the methods of learning that involves the use of computers and the Internet."

Commission of the European Communities (2001) defines E-Learning as "the use of new multimedia technologies and the Internet to improve the quality of learning by facilitating access to resources and services as well as remote exchanges and collaboration."

Solutions:

According to *Merriam Webster dictionary* (2012b), solution is something that is used or done to deal with and end a problem: something that solves a problem.

E-Learning Solutions:

There is as such no definition given so far by any of the dictionary or encyclopedia for e-learning solutions. However, as per the investigator's perspective, e-learning solutions are the custom instructional design principles and assessments for creating an effective and efficient e-learning course out of it using various authoring tools. These include Learning Management Systems, Learning Content Management Systems and Content Management Systems. They can be both proprietary and open source which help to create unique solutions and improves performance through better learning options.

Library and Information Science:

Online Dictionary for Library & Information Science (2012) defines Library and Information science as an interdisciplinary field that applies the principles and practices of various disciplines like management, information technology, education, and other areas to libraries like accumulation of recorded information, organization, maintenance and dissemination of that information for its effective use.

The core function of the libraries is to make humans informed via intermediation between instrumental records and inquirers. It educates to create reader's advisory resources to encourage young students to develop a lifelong love of reading and learning and help scholars locate archival and other

resources crucial to their work *(Information School, University of Washington[2]).*

1.5 Objectives of the Study

The aim of the study undertaken is to look at the already designed e-learning portals and services they offer, their flaws and drawbacks, efficiency of the system, platform of design and development and the policies they follow.

It is an attempt to provide a better e-learning solution in Library and Information Science discipline whereby the insights gained have been used to improve pedagogical practices in online learning.

The study under purview is formulated and carried out on the following laid down objectives:

- To have a careful study of online learning experience of the faculty members of various universities in the field of Library and Information Science in India.
- To evaluate the select e-learning web-portals of various select universities so as to ascertain various pros and cons in their design and development.
- To find out the technological infrastructure used in the existing web-based select e-learning systems in the country.
- To understand the shortcomings in the designed e-learning portals of the select universities that already exist from various subject fields.
- To design and develop a state-of-art model e-learning prototype for LIS professionals and students in India.
- To provide necessary suggestions to facilitate, extend and improve the quality of online LIS education.

1.6 Hypotheses

On the basis of the objectives drafted, the following hypotheses have been formulated:

1. There is adequate infrastructure and expertise available in all the

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2. Information School, University of Washington (https://ischool.uw.edu/academics/mlis/what-is-library-science)

universities under study for providing e-learning.

2. There is no significant difference in the opinions of e-learning proficient staff and students with regard to weakening of student-faculty relationship in e-learning environment.
3. There is no significant difference among faculty members with regard to the apprehension due to adoption of e-learning for delivering education.
4. Private universities are far ahead in delivering online instructions efficiently with innovative technologies than the government universities and institutions in India.
5. Students are more satisfied with the content delivery speed of e-learning mode of teaching than the proficient staff members.

1.7 Scope and Limitations of the Study

E-learning is about the learning and teaching practices in a creatively different way by changing roles form online teacher to online student. This is moving beyond traditional paradigms that tells us how to improve online practice and or prescribe online teaching practices.

The work entitled "Design and Development of E-learning Solutions in Library and Information Science" is an attempt to look at the already designed e-learning portals, services they offer, their flaws and drawbacks, efficiency of the system, platform of design and development and the policies they follow.

There are a large number of universities, institutions and academic organizations throughout the country which offer various degrees in Library and Information Science. So, the investigator has restricted its scope to the oldest top ranking twenty universities in India, having adequate infrastructure to support e-learning system and substantial faculty, which are offering education in this field of knowledge. They are as follows:

(i) Aligarh Muslim University (1875), Aligarh, Uttar Pradesh

(ii) Banaras Hindu University (1915), Varanasi, Uttar Pradesh

(iii) Bangalore University (1886), Bangaluru, Karnataka

(iv) Calcutta University (1857), Kolkata, West Bengal

(v) Delhi University (1922), New Delhi

(vi) Guru Nanak Dev University (1969), Amritsar, Punjab
(vii) Indira Gandhi National Open University (1985), New Delhi
(viii) Jammu University (1969), Jammu, Jammu and Kashmir
(ix) Kashmir University (1956), Srinagar, Jammu and Kashmir
(x) Karnatak University (1949), Dharwad, Karnataka
(xi) Kerala University (1937), Thiruvananthapuram, Kerala
(xii) Kurukshetra University (1956), Kurukshetra, Haryana
(xiii) Madras University (1857), Chennai, Tamil Nadu
(xiv) Mangalore University (1980), Mangalagangotri, Karnataka
(xv) North-Eastern Hill University (1973), Shillong, Meghalaya
(xvi) Osmania University (1908), Telangana, Hyderabad
(xvii) Punjabi University (1962), Patiala, Punjab
(xviii) Rajasthan University (1947), Jaipur, Rajasthan
(xix) University of Mumbai (1857), Mumbai, Maharashtra
(xx) University of Mysore (1916), Mysore, Karnataka

The investigator also selected eight other universities for survey which provide e-learning in various subject fields in India. The universities have been selected on the basis of online delivery of learning and these are the only universities that apply most of the online learning objects and online methods of delivery of education and learning. These are the top universities which provide full fledged E-learning courses in Library and Information Science and Management fields. The list is given as under:

(i) Amity University (2002), Noida U.P
(ii) Delhi University (ILLL, 2007), New Delhi
(iii) Don Bosco University (2007), Azara, Guwahati
(iv) Indira Gandhi National Open University (IGNOU, 2009)
(v) Kashmir University (EMMRC, 1987), Jammu and Kashmir
(vi) Mumbai University (DLLE, 1994), Mumbai, Maharashtra
(vii) Symbiosis International University (2002), Pune, Maharashtra
(viii) The Global Open University (2006), Nagaland

Field research has been so designed that within and according to these universities, both the faculty members and student community have been taken into consideration.

1.8 Research Methodology

Methodology is a general approach to empirical research of a particular discipline. Objectivity in any research investigation comes only through a planned and systematic way of investigation. This is achieved through the process of research methodology applied and adopted with a careful way of identifying and applying various techniques and choosing samples using appropriate sampling techniques.

The investigator has adopted the following methods for conducting the study:

- Questionnaire Method
- E-learning Website/Web portal Evaluation

(i) Questionnaire Method

To collect the necessary data for the study, the investigator designed two sets of questionnaires, one for Library & Information Science faculty members, second for the e-learning proficient staff and students pursuing various e-learning courses in the same institutes.

The questionnaire for the faculty members is designed to know the necessary requirements for the development and design of an e-learning system, the techniques and means of communication in a delivering system, which is best suited to the general interests of all the faculty members, and the strategies for effective assessment from online instruction.

The second category of questionnaire for the proficient staff and students includes the most preferred type of software platform, the versatile infrastructure and cost for delivering learning, the features and assessment techniques and the problems and intricacy faced during resource creation, content management and delivering of an online instruction. The questionnaire is designed to understand the needs and expectations of students from online instruction, the techniques and methods of delivering which suits them, the

technological constraints or complexities they face during the course and the effectiveness of online delivering system.

(iii) E-learning Website/Web portal evaluation

A comprehensive study and evaluation of the select university e-learning websites and/or web portals has also been conducted in order to find out the pros and cons of the e-learning systems developed by them so that a complete state-of-art prototype shall be developed without any problems and loopholes.

1.9 Variables Taken

In order to achieve the objectives of the study, three variables were taken for detailed analysis:

- Library & Information Science Faculty Members
- E-Learning Proficient Staff
- Students

1.9.1 Population and Sampling

As the name implies, a sample is the smaller representation of the large population. The observation of population as a whole would involve a mess of data that analysis would be slow and tedious. Moreover, the analysis of large quantities of data is wasteful when a smaller portion would suffice (Goode and Hatt, 2006).

In view of the large number of universities across India that provide learning in Library and Information Science, stratified sampling technique is chosen to select the universities on the basis of:

(i) the year of establishment of the Library and Information Science departments.

(ii) number of faculty members in these departments (not less than three).

(iii) infrastructure ample for undergoing or planning to initiate any e-learning project and

(iv) the universities which comes under the scheme of NME-ICT.

(v) universities which are providing full fledged e-learning courses in Library and Information Science and Management fields.

The other eight universities in India were selected systematically for being the well established and reputed institutions in providing their courses completely online.

A total of 108 online questionnaires were administered among the faculty members of Library and Information Science in the month of May, 2011. The responses received were 84 out of which three were incomplete and one of the questionnaires was rejected. So, a total of 80 questionnaires were selected for the study.

A total of 64 online questionnaires were administered for the e-learning proficient staff of eight universities providing e-learning in the month of November 2011. The responses received were 52 and none of them was incomplete.

For students pursuing various online courses, a total of 480 online questionnaires were distributed in the month of November 2011, out of which 60 did not responded, 2 were left incomplete by the students. Thus, the total responses taken for study were 418. The total response rate of faculty members, proficient staff and students was found to be 77.7%, 81.25% and 87.5% respectively while the average response rate for all three was 82.15%.

Number of Respondents			
Categories	**LIS Faculty Members of 20 Select Universities**	**E-Learning Proficient Staff of 8 Select Universities providing E-Learning**	**Students and Learners from 8 Select Universities providing E-Learning**
Questionnaires Administered	108	64	480
Questionnaires Received	84	52	420
Incomplete Questionnaires	4	0	2
Questionnaires Analyzed	**80 (77.7%)**	**52 (81.25%)**	**418 (87.5%)**

Table-1 Sample Distribution

1.10 Data Collection and Analysis

The investigator personally visited various universities and evaluated various e-learning portals and thoroughly examined the softwares to collect necessary data and to choose a strong platform for e-learning solutions. Questionnaires were administered to the faculty members, professional staff and students personally and via e-mail using online questionnaire developer tool 'Kwik survey'. Duly filled questionnaires were received in the months of July and December 2011 through emails.

The collected data is analyzed and tabulated according to the responses sought in the questionnaires. For analyzing data, Simple Percentage and Chi- Square methods have been used.

1.11 Standard Followed

For providing the bibliographical references, American Psychological Association (APA, 2010) format has been followed. Some examples are given as under-

Single Author

Rumble, G. (2001). The costs and costing of networked learning. *Journal of Asynchronous Learning Networks,* 5(2), 75-96

Two Authors

Voci, E., & Young, K. (2001). Blended learning working in a leadership development programme. *Industrial and Commercial Training,* 33(4/5), 157-161

Two or More Works by the Same Author in the Same Year

Berndt, T. J. (1981a). Age changes and changes over time in prosocial intentions and behavior between friends. *Developmental Psychology, 17,* 408-416.

Berndt, T. J. (1981b). Effects of friendship on prosocial intentions and behavior. *Child Development, 52,* 636-643.

Article in Journal Paginated by Volume

Rich, D. (2001). A new way to develop employees. *Electronic Business,* 27(8), 8-9

Basic Format for Books

Roblyer, M. D. (2003). *Integrating educational technology into teaching (3rd edition)*. Upper Saddle River, New Jersey: Merrill Prentice Hall.

Conference Proceedings

Schnase, J. L., & Cunnius, E. L. (Eds.). (1995). In Proceedings from CSCL '95: *The First International Conference on Computer Support for Collaborative Learning*. Mahwah, NJ: Erlbaum.

Online Resources

Choy, Sarojni (2007). Benefits of e-Learning Benchmarks: Australian Case Studies. *The Electronic Journal of e-Learning*, 5(1), 11-20. Retrieved March 22, 2010 from http://www.ejel.org/Volume-5/v5-i1/Choy.pdf

1.12 Chapterization

The study comprises of seven chapters. Each chapter deals with different aspects of the research work, as explained below:

Chapter- 1: Introduction

The chapter includes the prelude of the whole study undertaken along with the concepts and modes of e-learning. The chapter begins with the introduction explaining the background behind the research. It includes the historical background of e-learning. It explains the terms used in the statement of the problem in addition to objectives, hypotheses, scope and limitations of the study. Research methodology used for the collection of data and methods of data analysis have also been explained.

Chapter- 2: Review of Related Literature

This chapter reviews the pertaining literature that was examined to study the various trends of the study. It deals with the various aspects of e-learning with respect to the design & development, tools & technology, e-learning standards & softwares, role, impact and success of various e-learning projects, e-learning in higher education and e-learning in Indian and International perspective.

Chapter- 3 E-Learning in LIS-Education

This chapter describes in detail about e-learning, its need, key drivers, challenges, pre-requisites, advantages/ disadvantages, various e-learning

initiatives in the country and the suitability of e-learning in Library and Information Science education in India.

Chapter- 4 E-Learning Content Management Systems

The chapter deals with the understanding, characteristics and components of learning management systems and learning content management systems. The detailed account of various e-learning softwares has been given and the e-learning platform (Joomla) on which this portal is designed has been dealt in depth. It also includes core features and issues in the integration of LMS & LCMS in an organization.

Chapter- 5 Data Analysis and Interpretation

In this chapter, data analysis and interpretation is provided. Various tables and graphs have also been made to explain the different aspects and activities in e-learning throughout the world and in India along with the analysis of responses received from the respondent groups.

Chapter- 6 Design and Development of E-learning Prototype

This chapter provides the insights about the security, design & development, strengths and weaknesses, content management and the database model of the e-learning prototype designed in the field of Library and Information Science.

Chapter- 7 Major Findings, Recommendations and Discussion

This chapter provides the summary of major findings and recommendations needed for improving the status of e-learning in Library and Information Science. The findings are deduced from the study undertaken and are based from the results of data collected.

Bibliography/Webliography
Appendices

- ***(a) Appendix I (Questionnaire for LIS Faculty Members)***
- ***(b) Appendix II (Questionnaire for E-Learning Proficient Staff and Students)***

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Chapter-2

Review of Related Literature

CHAPTER-2
REVIEW OF RELATED LITERATURE

"Learning without thought is labor lost; thought without learning is perilous"

~ Confucius (551–479 BC)

2. Introduction

A literature review is an organized presentation of what has been published on a topic by scholars. It acts as a path finder in the process of research; the vision is directed towards achieving a particular goal. It helps to know where and what former scholars have left and how to start from that point.

The intention and rationale of this literature review is to better understand the research that has informed the development and design of e-learning. The following section begins with a review of e-learning, its role, impact and success. Subsequently, there is a discussion of courseware, tools and technology, softwares used, standards followed and supported by various key theoretical underpinnings. Finally, this section offers an examination of relationships among these factors. They have been drafted under the following paras:

i. E-Learning: Role, Impact and Success
ii. E-Learning Tools and Technology
iii. E-Learning Softwares
iv. E-Learning Standards
v. E-Learning Courseware
vi. E-Learning in Higher Education
vii. E-Learning in LIS Education

2.1 E-LEARNING: ROLE, IMPACT AND SUCCESS

2.1.1 Role

E-learning has become an active learning methodology and teaching technique that it is instilling in students a sense of self discovery without sacrificing the basic tenants of educational taxonomy or a rigorous understanding of the foundation and development of the academic disciplines the student may be

studying and need to learn. The main roles of e-learning is to extend learning that involves the addition of discussion forums/email/virtual presentations, software simulations, etc. to existing learning and replace traditional learning with new and effective method of teaching and learning. The literature about the role of e-learning by various authors is summed up under.

Saeed & Samani (2014) says that the revolution brought by Information Technology and Tele-Communication has put a challenge for modern educationists to cope up and move quickly to join the revolution. The objective of the education from education for all is to be changed to distinguished education and excellence for all with the aim of using ICT for teachers, students and business men. Scientific research looks forward to improve the coming generation in the application of acquiring skills. In order to realize those aims, it requires the changing of traditional education pillars like teachers, learners and schools and changes it to more modern educational operations.

In present days, our societies are slowly becoming knowledge-centric and pushing people to learn more things in order for their day-to-day survival (Joshi, Subrahmanyam & Anvekar, 2014). In line with the societies' trend, majority of the organizations are completely becoming knowledge driven and hence, the success of any organization is highly dependent on how it trains, motivates and creates an environment which is conducive for learning, for their workforce in all levels, irrespective of their position in the corporate ranking. To address this, today's knowledge solutions must be crisp, quick and should be available readily at a handy distance. This forms the genesis and preamble for on-demand e-learning for customized skills enhancement.

The greatest asset to e-learning is its ability to allow the student to control the learning process by offering him an immediate, action oriented, practical learning experience (Kamsin, 2005a). The author feels it for sure that conventional learning will be replaced by e-learning in the forceable future. With web based learning, communication among learners from remote places are enhanced, knowledge being acquired and transferred among the learners,

the ability to conduct an open discussion is enhanced and students can learn according to their own schedule. All these facilities create the creative abilities that cannot be seen in conventional learning. According to author, the most important for the learning process, besides the above said points, is the flexibility and it can be best seen in e-learning.

Furthermore, e-learning aims at replacing old-fashioned time/place/content predetermined learning with a just-in-time/artwork- place/customized/on-demand process of learning (Alsultanny, 2006a). E-learning attempts to automate education, replace a paid instructor, and develop self-paced learning, but for this purpose, an efficient management support and IT platform is needed. Key to success is the ability to reduce the cycle time for learning and to adapt 'content, size and style' of learning to the respective user and their learning environment. E-Learning is ideal for global corporations with people in multiple time zones; there is no need to coordinate travel and delivery schedules. According to the author, Internet-based training can reduce costs, with housing and travel costs accounting for the majority of the savings.

In search of better, more cost effective ways to deliver instruction and training, universities and corporations have expanded their use of e-learning (Smart & Cappel, 2006). Estimates suggest that the amount of money U.S. companies spent on the IT-based delivery of training grew from $3 billion in 1999 to $11 billion in 2003. In addition, the worldwide market for e-learning was projected to be more than $18 billion by the end of 2005 with some organizations projecting that over half of their training and education will be delivered electronically over the next five years. This suggests the role and greater potential of e-learning in the promotion and enhancement of learning. Technology and online instruction can facilitate learning by providing real-life contexts to engage learners in solving complex problems.

Rising costs, shrinking budgets, and an increasing need for distance education are causing educational institutions to re-examine the way that education is delivered. In response to this changing environment, e-learning is being implemented more and more frequently in higher education, creating new and

exciting opportunities for both educational institutions and students (Wagner, Hassanein & Head, 2008a). Globally, the demand for post secondary education is increasing and these reasons have favoured the growth of the higher education e-learning industry. With the limited capacity of existing classrooms at academic institutions and the prohibitive cost of building new facilities, e-learning is an attractive alternative.

Due to the vast improvement in computer technologies, e-learning is ready to transform the educational scenario and is being accepted by more and more schools and institutions. It is now feasible to offer remote students full, interactive participation in a class that would previously have been restricted to students who were attending locally. The creation and delivery of information has increased the capabilities of learning and this enables the knowledge to be distributed widely (Kamsin, 2005b). By utilizing e-learning effectively, university's ability to transfer knowledge and expertise to remote societies can be enhanced. E-learning is made up of several methods of learning and use network technology to create, deliver and to enhance learning capabilities through Internet.

Since faculty typically develop their own course content, it is important for institutions to consider faculty needs, interests, and capabilities as institutions begin to introduce web-based courses and online degree programs. If institutions have desired pedagogical standards for such courses, it is important for the instructors of those courses to feel confident in the course material as well as the instructional environment (Summers et al., 2005). While the online learning environment poses some challenges, there are some core teaching principles that continue to exist such as the setting and communication of expectations, providing student feedback, and the evaluation of student work.

University education in both Europe and the USA has for a couple of decades been in focus for revision and transformation. Several western researchers have described this development as "mass education." More and more students are supposed to be educated within higher education by means of fewer and fewer resources. One way of supporting and improving education

may be found within the transformation of teaching and learning commonly referred to as flexible learning, i.e. developing courses with the help of flexible learning methods and the support of ICT (Karlsudd & Tagerud, 2008). Thus e-learning is better seen as the only viable solution for this mass education.

The positive role of e-learning can be best viewed by looking at the pace of transformation of the Higher educational institutions who are increasingly moving toward the use of the Internet and related technologies for delivery of their courses, both on campus and at a distance (Siragusa, Dixon & Robert, 2007a). E-learning provides significantly different and interesting possibilities for computer-meditated communication and learning from other forms of educational technologies. The entire class website can be duplicated onto a CD-ROM for the students with slow and unreliable Internet access. In other cases, the lecturer may use a class website as a supplement to their face-to-face delivered classes. Students in higher education are demanding greater flexibility in the delivery of their courses and all this can be achieved with the idea of e-learning.

When a plane breaks the sound barrier, the noise reverberates for miles around. The advent of e-pedagogy produced no sonic boom, but the message educators are getting rings loud and clear. Technology is a potentially powerful tool for more effective teaching and deeper learning. Used wisely and well, it may break down barriers to learning that traditional classroom-based instruction has unintentionally created (Kuriloff, 2005). Face-to-face, real-time interactions offer immediacy, personal contact, and community—all highly regarded features of a positive learning environment—instructors creating courses for online delivery have commonly considered the absence of face-to-face interaction a loss and have struggled to compensate for that loss. The quest for good pedagogy along with the effort to employ technology as a tool to enhance learning has introduced new thinking about how we might teach more effectively. Instructors have only just begun to rise to that challenge.

Besides the possible illumination of poor educational systems in developing countries, e-learning can prove equally an alternative for the educational

support of the deaf, as a paradigm of deaf inclusion in the information society (Sapountzaki et.al. 2006). Design and development of educational content for teaching GSL (Greek Sign Language) to early primary school deaf pupils, has resulted in a platform that uses a signing avatar to present educational objects. The platform employs standard techniques to present educational material presentation in deaf classes and also allows tutors the option of dynamically modifying educational material according to lecture planning and class needs. However, moderate extensibility of current functionalities and addition of content-related options will enable its exploitation as a bilingual application.

2.1.2 Impact

The impact of e-learning can be seen more clearly by the facts that there has been an extent in the nature and use of e-learning in further education worldwide. Learning attitude of teachers and learners has changed in a positive sense as more and more faculty members are ready to accept e-learning and its technology. The learner attitude and confidence has boosted with e-learning and the access to e-learning resources has increased many folds with the students able to plan, prepare, share materials and communicate with other learners. Following the positive impact of e-learning, numerous centres are being setup in various parts of the country and abroad. Universities and colleges are adopting new technology to keep pace with the changing world. The impact of e-learning can be ascertained from various studies worldwide among which some are mentioned below.

Patel & Shah (2014) believes that teaching and learning phase has been changed now a day. The students prefer global learning system rather than the physical, rigid learning process which was used till the time. Chalk sticks, board, duster, books and all those physical things have been replaced by e-learning process where fundamental focus is on internet. Students are posting their queries on the public forum to get answer and within short period of time they are getting very good response. The author's believe that the goal is to integrate software and hardware for e-learning system, online education and

web technologies based multi-agent system, information technology integration to teaching which will result in advanced teaching and learning system.

The complexion of higher education sector has undergone a sea change in the last two decades. Internationally, a majority of the institutions offering higher education is making strenuous efforts to revise its academic orientations and the course delivery strategies in the light of the interplay of these global changes and emerging challenges. With the advent of the Internet technology, integration of the Information technology (IT) tools into higher education stream has become an easy task (Elango, Gudep & Selvam, 2008a). In this context, online learning mode has emerged as a major higher education option before the global student community and as a consequence, virtual universities are built directly on the computer networks to offer online education.

Further highlighting the impact of e-learning, Tutunea, Rus & Toader (2009) says that e-learning has developed as an alternative to traditional education because the globalization of the online environmental communication has influenced all sectors of human activity and education as a personal and professional training has undergone the same trends. Many universities are joining the trend of translation from traditional education to online learning environment and it increases the flexibility of students' study program. The permanent access to courses and the possibility to have quick feed-back from teachers, on one hand, and their reduced time for study, on the other hand, determine the positive influence of the platform on the students' study time.

The lecturer's role is an important factor in the design of online learning environments in that various roles can be supported (Siragusa, Dixon & Robert, 2007b). A lecturer may need to assume a didactic role in order to guide student's learning. A lecturer with postgraduate students studying entirely online may assume a facilitative role and be available to assist students as required either through online communication facilities or via telephone. Lecturers should routinely check the online communication facilities for new postings and provide prompt and adequate replies to student questions. Lecturers with a low perception of the importance of online learning may not

fully consider how to apply online strategies to enhance their students' learning. E-learning is pushing lecturers to show decision making input, online support and training and online abilities to enhance students' learning.

The Internet has profoundly changed the way we communicate and interact with one another and has brought dramatic changes to education as well. As of 2003, 100% of public schools in the U.S. had Internet access, up from 98% in 2000. Ninety percent of public schools offered Internet courses using asynchronous computer-based instruction. Eighty-eight percent of public schools indicated plans to start or increase use of the Internet as a primary mode of instructional delivery (Lee-Post, 2009a). There has been 14% increase in distance learning courses, 123% in college enrollments and 45% increase in using asynchronous internet-based technologies in U.S.A. All this provide strong evidence that Internet-based technologies have transformed traditional in-class learning to a new way of learning called e-learning.

QAA (2006) in its report of the outcomes from 70 institutional audit institutions' support for e-learning reported that institutions were meeting the challenges involved in implementing strategies and policies, resourcing and coordinating projects and initiatives, and providing guidance and support for staff developing and delivering e-learning. Several institutions had recognized their responsibility to provide training in the pedagogical, as well as the technical, aspects of e-learning. In view of the impact of blended teaching methods on students' learning experience, several reports indicate that care had been taken in collecting student feedback. The reports confirm that students welcome the increased use of e-learning and are generally positive about the quality of their experience of e-learning and distance learning.

Further looking at the impact of e-learning, Goi & Ng (2009) has given the account that the govt. of Malaysia is interested in continuously developing the people by promoting a 'Continuous Learning Concept' at the industry, organization and individual level in both the public and private sectors. The Government will set up the national 'Lifelong Learning Council and has directed the public and private higher educational institutions to establish one

centre of life-long learning. Universities in Malaysia have responded actively to this challenge, guided by the Ministry of Education's strategies to enhance the use of ICT in the e-learning. Thus e-learning has left a mark on the developing countries to improve the sector of education by accepting the new forms of learning.

Falcao and Soeiro (2007) maintained the impact of e-learning by saying that in Higher and Continuing Education, the use of e-Learning methodologies is becoming a common resource. Also, e-Learning is by its nature a multidisciplinary subject and, consequently, very complex. In the past years, e-learning strategies have been implemented in Institutions of Higher Education and others. Although these implementations have different objectives and follow different strategies, the importance of the use of e-learning technologies to improve the Quality of Education has been widely accepted. Implementation of e-learning is very diverse, technically and pedagogically, and the learning outcomes increase considerably as have been shown by the studies of various e-learning pilot projects.

E-learning has the potential to revolutionise the way we teach and how we learn. The recent developments in technology are changing the role of the teacher and the learning experiences of school children, engendering an exciting future where students study increasingly from places other than school. A new milestone in the development of e-learning in schools will be the use Virtual Learning Environments (VLEs), enabling new opportunities to personalize learning (Boulton & Trent, 2008). Increased development with e-learning in schools will enable a more flexible use of the school building and the school day, as well as vertical grouping and movement of students. In U.K. there has been an establishment of 10 broadband consortia to support the development of e-learning within schools. Thus the impact of e-learning is very visible and its future predictions are very clear.

The impact of e-learning is better seen on the industries as well. One of the famous industry analysts Brandon Hall found that companies using technology-delivered courses experience a 40-60 percent cost savings over instructor-led

education. Perhaps even more important than cost savings are the flexibility, adaptability, and responsiveness of the e-learning approach in a world where learning faster and better may be the only sustainable competitive advantage (Longmire, Tuso & Wagner, 2000). As the Internet has expanded and e-commerce has mushroomed, the possibilities for e-learning delivery have become increasingly attractive. A recent InformationWeek survey of 300 information technology executives indicated that online courses are likely to become the standard method of corporate training within the next few years.

The Corporate world has been the main driver of e-Learning. The main uses have been corporate training and knowledge management initiatives that are gradually merging, as organizations become more and more knowledge driven. It has altered training goals and expectations. It has also created a mechanism to develop and implement programs when and where needed. E-Learning is shown to be effective in changing organizational culture so as to facilitate the sharing of knowledge instead of continuing to reward the hoarding of it (Chakraborty, N.Da). It has been predicted that the number of corporate universities will exceed traditional ones by 2010. There are many reasons why e-Learning is entering the workplace. Firms view it as a new way to 'deliver instruction, boost worker productivity, broaden training opportunities, reduce costs, improve instructor productivity, stay competitive, improve motivation and morale, and implement strategic initiatives.'

E-learning has enrolled itself in the educational society and to meet the growing demands of students, teachers are required to be able to blend themselves effectively in such an environment. For this reason, UNESCO's took an initiative for the Next Generation of Teachers (Next Gen) Project which is designed to assist Teacher Education Institutions (TEI) in the Asia-Pacific region to prepare them to judiciously use technologies for teaching and learning to address the new classroom environment (Bogart, 2009). The basic change that's taking place in learning methodologies is changing the focus from a teacher centered classroom to a student centered class room.

Rural students look to e-learning for advanced courses (Collins, 2005). More and more, students in rural districts are looking to distance education, or e-learning, to take advanced- level courses that aren't available in their schools. A study released in March by the U.S. Department of Education found that one-third of public school districts had students enrolled in distance education courses in 2002-03. Nearly half of all rural school districts had students taking distance education courses. Less than 10 years ago, no state used the Internet to provide courses to middle or high school students. But distance learning has exploded in popularity over the past few years as technology has improved and budget constraints have made it increasingly difficult for schools to offer a wide variety of courses.

The concept of digital divide is quite prevalent between rural and urban India (Mukherjee, 2002). When it comes to the availability of resources, rural sector has always suffered. Now with the passage of time, there has been a shift in the government decisions in terms of spreading education in rural areas. The rationale behind the idea is to enable them utilize the natural resources by providing them the vocational training with an academic perspective which is available in their area in order to make their living. Various initiatives like Gramjyoti, Gyandoot, Byrraju foundation, AKSHYA, AAROHI etc. have been taken by the central and state governments after the importance of distance and online education was felt.

Over the last six years, the Australian Government has invested over $95m to enhance e-learning in the vocational education and training (VET) sector. This investment was based on the espoused benefits of e-learning. There is much anecdotal evidence and some research to corroborate the benefits of e-learning and provide support for the return on investment in e-learning technologies (Choy, 2007). In 2004 the Australian Flexible Learning Framework developed a suite of quantitative and qualitative indicators on the uptake, use and impact of e-learning in the Vocational Education and Training (VET) sector. It was the intention of the Framework to develop the indicators, test these and make them

available for users to adapt these to establish organizational goals and benchmarks for e-learning.

2.1.3 Success

The success of e-learning has been visible with the growing market of e-learning. The market for global higher education has grown beyond expectations and today, the success goes in billions and still growing. With the limited capacity of existing classrooms at academic institutions and the prohibitive cost of building new facilities, e-learning is an attractive alternative. The success of e-learning has been summed in the below mentioned reviews of literature on e-learning benchmarks and success.

E-Learning is a boomerang around the world. Government and corporations see it as an essence of business strategy, and the students have gone mad for the courseware and the flexibility of the system (Rajpal, Singh, Bhardwaj & Mittal, 2008). Many organizations in India like ICAI, ICSI, ICWAI, ICFAI and others have developed the successful distance learning course wares and modules. These organizations have been successful in the operation of this modular distance-learning model since their inception. The success of these Institutes can be attributed to the fact that being a distance-education society, they provided the latest industry oriented curriculum and syllable, fair and robust evaluation systems and the management and administration by professionals of the same field.

In 2001, Northumbria University rolled out an institution wide adoption of the Blackboard Virtual Learning Environment (VLE) and within few years, there was over 90% take up by academic staff with 32000+ students attached to live sites and now this e-learning platform (eLP) has became the integral part to e-learning of virtually all their students (Bell & Farrier, 2008). The university had recognized that e-learning is not simply making use of a VLE but covers a broader spectrum of information and communication technologies (ICT). Till then, it continues to improve and upgrade its virtual learning environment and the continued cycle of improvement in which the university engaged provided

benefits for the whole institution, individual areas within it and for the wider higher education community in the UK.

The success of the e-learning is better analyzed by the stakeholder matrix in which the responsibility for the success of e-learning is dependent on various stakeholders' viz. students, instructors, content providers, technology providers, employers and accreditation bodies (Wagner, Hassanein & Head, 2008b). Each stakeholder group has an important role towards the common goal of enhancing the overall learning experience. Students and Instructors should provide feedback to improve future experiences, and communicate the learning possibilities that e-learning creates. Institutions should provide the technical infrastructure and support while as Content and Technology Providers should provide high quality, interoperable solutions that consider learning principles. Accreditation Bodies should provide and enforce clear guidelines for this new form of learning delivery. Employers need to recognize the validity of this form of education and work with other stakeholders to ensure that graduates meet the needs of the job market.

DeLone and McLean (2003) brought an e-learning success model which succeeded in bringing together an integrated view of information systems success. Lee-Post (2009b) also came up with a success model which was adapted from DeLone and McLean's model and it not only succeeded in the same perspective as that of the said model, but the model also helped instill a process approach to information systems success. The process approach posits that the overall success of e-learning initiatives depends on the attainment of success at each of the three stages of e-learning systems development: design, delivery, and outcome analysis. A primary contribution of this research is in furthering our understanding of how to define, assess, and promote e-learning success.

Elango, Gudep & Selvam (2008b) tried to find out the quality and success of e-learning and reached to the following conclusions after their study: (a) e-learning never resort to any kind of malpractice; (b) e-books, e-journals, blackboards and WebCT are useful; (c) testing instruments and grading are

satisfactory; (d) graphic animations makes it interesting. But weaknesses were also observed which, in their opinion, could be rectified more easily by imparting a better approach and perspective. A holistic approach needs to be adopted by all concerned for the success of the e-learning system with regard to various vital aspects such as administrative issues, course contents, instructor support, viper sessions, grading and assessment etc. so as to maintain the standard at par with the other most effective traditional methods of learning.

2.2 E-LEARNING TOOLS AND TECHNOLOGY

For many faculty and students, web-based instruction and learning is often a new experience. Without previous e-learning experience, it can be difficult to transfer traditional course practices to the new medium (Su, 2005). Newer technologies and the evolution of older technologies, such as forums, chatrooms, and pod casts help make the online learning environment highly interactive; however, without adequate preparation to use the technology, the technology seldom meets expectations.

The rapid expansion of Internet technologies has provided a range of learning management systems that can support teaching and learning activities through e-learning in educational and training institutions around the world. A web-based learning tool known as Course Management System (CMS) or Learning Management System (LMS) is generally used to deliver e-learning courses' (Daniel, 2013). One such example is the Divine Word University which is embracing the use of e-learning technology through the adoption of the Moodle platform to support and improve teaching and learning activities.

Academic ability also influences the way students use e-learning tools to support their learning. Students enter universities and higher educational institutions with varying levels of academic background (Rodgers, 2008). Some maybe fast learners while others need longer time spans in order to master skills being taught or learned. Some will know and understand the value of education while others may not be serious about getting an education. Students also enter tertiary institutions with varying levels of experience and exposure to computing technologies. Those who have some form of computer

experience will be more eager to use e-learning as a tool for learning than those with limited or no knowledge of it. This can hinder their progress in learning if they are not supported well by the learning institutions especially if the learning institutions use e-learning packages as teaching tools.

Various perceptions and attitudes on the use of technology for teaching and learning influence the way users embrace its use and application in learning environments. The study on the use of e-learning technology for teaching and learning showed users' perception of this mode of teaching and learning had a significant effect on students' interaction with the e-learning package (Iahad, et al., 2012). This suggests that whatever perceptions users have on the use of e-learning courses will influence their willingness or unwillingness to interact with them.

El-Khouly (2005) argued that CD-ROM technology, when used as a means for storing and sharing data, can ameliorate the current limitations of e-learning courses often been viewed as a competitor to the Internet. While CD-ROM production is normally the realm of professional content creators using complex tools, the Internet has developed as a medium for which almost anyone can create content. Considering the poor connections of internet available in many developing countries, CD-ROMs become an attractive method for transporting static information, particularly if it is voluminous. Using a CD-ROM does not preclude the complimentary use of the Internet; it merely provides an alternate vehicle for the transmission of static content.

Foregrounding further the use of various e-learning tools, learning objects are given the top priority. The formal term for the "packaged" knowledge is a learning object (Cohen & Nycz, 2006). One of the most important aspects of e-learning are Learning Objects and the various software tools that aid in their development, storage, use in teaching, and administration. This is because e-learning is often delivered using specialized software and Learning Objects are the raw material of such systems. Commonly, learning objects' presentations include a variety of media, that is, they are multimedia in format. Likewise,

commonly their content is organized around standards like SCORM, IEEE etc. to create metadata about the contents of the learning object resource.

Further highlighted the importance of e-learning tools, Fetaji (2009) identified 18 indicators; they are defined as (1) learner education background; (2) computing skills level (3) type of learners, (4) their learning style and multiple intelligence, (5) obstacles they face in e-learning (e-learning barriers), (6) attention, (7) content (suitability, format preferences), (8) instructional design, (9) organizational specifics, (10) preferences of e-learning logistics; (11) preferences of e-learning design; (12) technical capabilities available to respondents; (13) collaboration; (14) accessibility available to respondents; (15) motivation, (16) attitudes and interest; and (17) performance-self-efficacy (the learner sense their effectiveness in e-learning environment); (18) learning outcomes. According to author, each e-learning initiative when measured against the provided indicators and based on them designed and build, the e-learning will be sustainable.

LMS portal defined as a tool by Ramshirish and Singh (2006) has the power of Communication, Organization, Management and Training. All e-learning developers don't have access to programming support, or they don't want to be restricted to simple HTML. This need has given rise to a varied number of commercial as well as open-source software products that could be used as specialist e-learning authoring tools. LMS is a technology driven platform that enables educational institutions and business organizations to move teaching, training and learning initiatives and programs on the Internet for e-learning to take place. It provides Internet/intranet based infrastructure for teachers, instructors, trainers and program directors to manage and track a student, employee, trainee's participation and performance in e-learning.

WWW has led to a new challenge in the form of distributed information which is interpretable by humans only and machine support is limited. In e-learning it can pose a problem for the generation of hypertexts and could be overcome by the help of semantic web. The important property of the Semantic Web architecture i.e. (common-shared-meaning and machine-processable metadata),

enabled by a set of suitable agents, establishes a powerful approach to satisfy the e-Learning requirements (Alsultanny, 2006b). Semantic Web can be exploited as a very suitable platform for implementing an e-Learning system, because it provides all means for e-Learning: ontology development, ontology-based annotation of learning materials, their composition in learning courses and (pro) active delivery of the learning materials through e-Learning portals. The process is based on semantic querying and navigation through learning materials, enabled by the ontological background.

Two of the Wikis, Enviwiki and WikiPedFie are the portals that have effectively been used in the Czech Republic in preparation of e-learning materials. Wiki tools, which became known mainly due to Wikipedia encyclopedia, represent quite a new phenomenon on the Internet. Both of these if linked with LMS Moodle can offer a guaranteed source of brief information which can be used by students as an outline of the taught topics and a source of exact definitions (Jancarik & Jancarikova, 2010). Wiki tools may be used in development of e-learning courses not only for creation of a knowledge database but also for sharing of experience and teacher training. Wiki tools have also been successfully used in this area by the University of Athens for several years.

Reusable learning objects (RLOs), considered as one of the e-learning tools, are granular chunks of information that teach one or more objectives and can be meaningfully incorporated into multiple training contexts. To be useful for an organization's knowledge management strategy, RLOs must provide user access, content modifiability, content standards and interoperability in terms of platform and delivery mode, consistency in the design and development of content, and the scalability of digital entities (Chakraborty, N.D.b). Meta tagging of these knowledge bits allows learners to find and utilize reusable knowledge objects quickly and efficiently. While knowledge may "never generate itself," according to the author, technology can help in the process of sharing, stretching, compacting, and re-purposing it. However, agreed upon

standards and specifications will be needed for the development cycle of content and courseware.

According to Massa (2009), Dreamweaver and Macromedia Flash are an excellent starter tools for WBT and general web-page authoring. Essentially, Dreamweaver automates the authoring of web content by generating HTML and JavaScript code through a WYSIWYG interface. Among its many capabilities, Dreamweaver makes it easy to create animations and show/hide layers for WBT pages. Animations are one of the creative methods to make e-learning interesting and easy to grasp. Even though extensions are also available which they allows to create quizzes, including drag-and-drop exercises, and also to track learner results and output them to standards-compliant learning management systems (LMS). Author finds Dreamweaver fairly quick to learn and develop on but its capabilities are limited; Flash's output is practically unlimited. This is because Flash creates its own application file (SWF file) that runs inside the browser window but does not depend on the browser's native capabilities.

As the technology advances in the area of e-Learning, many e-Learning tools are coming up to aid in the development and delivery of courses, interoperability, transferability of skills and customization are becoming the major issues (Eswari et. al. N.D). XML gives flexibility to create customizable user interface architecture. In e-learning, learning content can be structured using XML documents. Content structured in XML has a self describing quality, allowing it to be played on any XML-enabled LMS regardless of the authoring environment in which it originated. To make student data and course material easy to read and exchange, the author stressed about the use of XML to tag or markup such information. XML also allows creating structured content that can be manipulated in different ways to achieve different educational deliverables.

Besides various tools, technology had a great impact on the success of e-learning. It is an inescapable element of business in the new economy. It is estimated that 50% of all employees' skills become outdated within 3–5 years.

Time-to competency is a major factor of determining competitiveness of all companies. As a promising solution, e-Learning technology has been widely adopted by many companies to expand their training market to previously out-of-reach employees (Zhang & Nunamaker, 2003). It is only because of the internet and related technology that synchronous and non-synchronous e-learning has been possible by which learning event is delivered in real-time to remote learners.

ICT and e-Learning platforms provide alternative channels for improving the quality of education and extending its reach to broader audiences. ICT and e-Learning strategies and advances in wireless standards and technologies—particularly in the areas of Wi-Fi, Worldwide Interoperability for Microwave Access (WiMAX), and mobile computing—can help bridge the digital divide in education (Symth, 2006). Using open broadband wireless standards and implementing mobile computing architectures, challenges of terrain, infrastructure and finance to increase could be getting over. Expanding these benefits to previously underserved populations generates improvements in education and income, and begins to close the digital divide.

The heterogeneity and distributed nature of web led to the need for web portals, web sites providing access to collections of interesting URLs and 'dumb' (i.e. keyword-based) search for information. However, differently from dumb web portals, semantic portals are "smarter" and carry out intelligent reasoning behind the scenes. We can think of a scenario where educational services can be mediated on student behalf and that is what author has referred to as semantic portal. The advantage of having such a portal is that students need not to look for courses distributed across many locations (Dutta, 2006). From the author's pedagogical perspective, semantic portals are an enabling technology allowing students to determine the learning agenda and be in control of their own learning. It is anticipated that semantic web technologies will influence the next generation of e-learning systems and applications.

Olsevicova (2006) had perused on another innovative technology known ad Topic maps. Topic maps are the ISO/IEC 13250 standards which can become

the core of an e-learning portal that will integrate different kinds of information and knowledge resources, available in the educational institution The Topic Maps model defined by author has three basic building blocks: topic, association and occurrence, which are the computer representations, relevant information sources and associations, which finds out if two or more topics are in association to recall. The author has explained how Topic Maps can be used for knowledge representation in distributed knowledge management systems and understands the exchange of Topic Maps to be the exchange of explicit knowledge.

2.3 E-LEARNING SOFTWARES

Authorware, also known as authoring tool, learning softwares, virtual learning environments, learning management systems, content management systems, learning content management systems, is a program that helps us write hypertext or multimedia applications, create quality online courses and manage learner outcomes. For e-learning to be a success, authoring tools offer a way to achieve that goal. E-Learning authoring tools enable trainers to integrate an array of media to create professional, engaging and interactive training content. With an authoring tool, we can repurpose digitized elements or learning objects from an existing course for use in a new course.

Al-Ajlan & Zedan (2007) have presented the key points of SOA (Service Oriented Architecture) that involve extended, loosely coupled activities among two or more independent academic and/or business partners. Such activities can be thought of as academic and business processes that engage several services in a manner that brings about the desired academic outcome. According to authors, SOA has the potential to bring about a decrease in programming difficulty and expense, lower maintenance costs, quicker time-to-market, new revenue streams and improved operational efficiency. They sense that deploying techniques like service descriptions, registrations, discovery and binding will open wide the door for collaborative VLE services that run under a flexible, distributed and effective manner. All these possibilities were proved by open source software Moodle.

There are economic reasons as well why programmers favour open source. The most important one is that they can build on existing code. The costs of a new solution can be lower than that of software made from scratch or built on commercial components. While standard economic theory holds that free-riding inhibits private investments in non-rival goods such as software (Bessen, 2001). According to author, the economic value of open source software can be in for-profit services that are sold with it or the reputation gained by the programmers combined with interesting job offers. Giving away the basic product for free and with the source code speeds up the network effect and thus increases the number of users.

Carabaneanu, Trandafir & Mierlus-Mazilu (2006) tried to provide a summary of current trends in the development of e-learning. The author finds that by recognizing that e-learning truly is a methodology, one can experience the greatest benefits that e-learning has to offer now and in the future. In the end, the fact remains that, with respect to e-learning, poor quality procurement practices are a barrier to growth and adoption. According to them, it is necessary to make a thorough evaluation when it comes to choose e-learning software for education in order to improve the knowledge of learners, the learning outcomes, the performance outcomes, and the business and policy impact and in order to value the money spent.

An evaluation of the most widely used open source learning management systems was done by Aydin & Tirkes (2010) to identify the most suitable open source e-learning platform. They analyzed and compared some open source learning management systems by using the full access versions reached from their web sites and a detailed analysis carried out by creating courses on each LMS proved that Moodle is the only LMS which has wider options with different access possibilities, modular structure, and advanced backup tools. Comparisons showed that, Moodle has the ability to view full user logging and tracking and activity reports for each student and has an advanced online exam module with time, date and duration constraints. All in all, it is possible to state that; due to the fast improvements of distance-learning, generalization of the

use of open source software Moodle would provide the development of learning tools and educational quality.

Wiley (2006) describes about the growth of open source softwares in the public and at large has begun to make itself felt in various ways within the arena of education. According to author, the growth is visible due to the influence in the wide array of open source software applications now available to educational institutions and instructors. Educational institutions have a growing array of options to consider when acquiring software and author opines that course management systems (CMS) like WebCT and Blackboard can now be replaced by attractive open source alternatives like Sakai and Moodle. Meanwhile, a plethora of educational applications are available to support student learning in higher education and Open source applications are, by design, adaptable and can therefore be applied to a variety of uses.

Talking about choosing criteria one should consider while choosing a suitable system, Mohammadi et al (2008) gave some of the inclusions like documentation, usage rate, structure, standards support and educational strategy. The authors feel that to buy or to design is the basic problem which needs to be looked upon. There are three ways one can choose from: purchasing software from an external vendor; purchasing software from an external vendor and producing the contents, internally or to use and develop the open-source E-learning systems. They find open source softwares more suitable for higher education because it is possible to change software according to the universities needs and add specific features to such systems by in-house professionals. The suggested solution is to use the open-source software and their further development or at least making a partial use of their architecture to come up with a new E-learning software system.

Moodle is a Content Management System (CMS) - a software package designed to help educators create quality online courses and manage learner outcomes. Moodle is Open Source software, which means it is free to download, use, modify and even distribute it (under the terms of the GNU General Public License). It is a free web application that educators can use to

create effective online learning sites. Moodle has a large and diverse user community with over 929431 registered users on this Moodle site alone, speaking over 78 languages in 211 countries. Moodle runs without modification on Unix, Linux, windows, Mac OS X, Netware and any other system that supports PHP, including most web host providers. Data is stored in a single database: MySQL and PostgreSQL are best supported, but it can also be used with Oracle, Access, Interbase, ODBC and others. Moodle also supports 50 languages.

Another software known as *Sakai* is a community of academic institutions, commercial organizations and individuals who work together to develop a common Collaboration and Learning Environment (CLE). The Sakai CLE is a free, community source, educational software platform distributed under the Educational Community License. The Sakai CLE is used for teaching, research and collaboration. Sakai increases our control over our investment levels, enabling us to leverage the functionality and support models that best meet the needs of our institution. Sakai is a Java-based, service-oriented application suite that is designed to be scalable, reliable, interoperable and extensible. While Sakai can be used for teaching and learning (similar to Blackboard and Moodle), it is a Collaboration and Learning Environment (CLE) because it embraces uses beyond the classroom.

Released under Open Source license, the *Claroline* platform allows hundreds of organizations from 93 countries to create and administer courses and collaboration spaces online. Claroline is capable of hosting a large number of users easily. It is compatible with Linux, Mac and Windows environments. Claroline is based on free technologies like PHP and MySQL and uses the current standards like SCORM and IMS/QTI for the exchange of contents. Claroline has been developed following teachers' pedagogical experience and needs. It offers intuitive and clear spaces administration interface. Translated into 35 languages, Claroline has a large worldwide users' and developers' community. Adjustable to various training contexts, Claroline is not only used

by schools and universities, but also by training centres, associations and companies.

Designed to be the first of its kind, *Coggno* makes it possible for learning content to be an asset that can be monetized in ways it never has before. Coggno leverages the power of the Internet to facilitate the acquisition and sale of high quality curriculum, enabling organizations and individuals to teach and learn more, as well as evaluate, and verify participation in the learning experience. Coggno provides a means to deliver best in breed training by harnessing the collective intellectual property of a given knowledge community with outstanding delivery tools. Coggno is a technological breakthrough for the learning world, combining data management and authoring capabilities with e-commerce technologies.

Joomla LMS is an aggregate of e-learning tools compiling into a powerful learning management system. It is a fully functional eLearning platform with innovative training/testing options (self-assessments) and advanced conferencing applications. Joomla LMS has a multi-language user interface and provides a convenient publishing mechanism as well as an opportunity to configure LMS front page and edit Graphic User Interface. Courses in Joomla LMS can be filtered by category, imported/exported and saved as course templates for further use. Documents in different formats (including various multimedia formats) as well as .zip content packages can be uploaded and managed. Storing documents in File Library provides an excellent opportunity to share documents for different courses. Forums and chats can be added to courses. Learners and teachers can exchange messages using embedded e-mail or the Dropbox tool that allows exchanging files without using e-mail. These features make Joomla one of the best e-learning software.

DSpace is the software of choice for academic, non-profit, and commercial organizations building open digital repositories. It is free and easy to install "out of the box" and completely customizable to fit the needs of any organization. DSpace preserves and enables easy and open access to all types of digital content including text, images, moving images, mpegs and data sets.

And with an ever-growing community of developers, committed to continuously expanding and improving the software, each DSpace installation benefits from the next. DSpace is freely available as open source software.

LAMS is a revolutionary new tool for designing, managing and delivering online collaborative learning activities. It provides teachers with a highly intuitive visual authoring environment for creating sequences of learning activities. These activities can include a range of individual tasks, small group work and whole class activities based on both content and collaboration. It provides teachers with a highly intuitive visual authoring environment for creating sequences of learning activities. LAMS is free and open source.

Dokeos is software for distance training (or learning management system). With a simple implementation and self-explaining for its users (trainers, trainees, audience of continuing education, etc.), Dokeos offers many tools dedicated to organizing trainings. Dokeos also offers a simple and powerful administration interface, making it possible to handle users, trainings, classes or sessions individually or in groups. Management of the entire platform is also possible through the administration interface. In addition to this ease of use, Dokeos has the great advantage being free software of which the source code is accessible and can be modified or adapted for more specific needs.

2.4 E-LEARNING STANDARDS

It is becoming clear that developing standards to enable instructors and learners to create, find, evaluate, reuse and share electronic content is essential to the long-term success of e-learning. Users are going to want to use and reuse content from lots of sources. Elliot Massie, President of the Masie Center, has said that content will be coming from lots of places "and I want learning and content to come from lots of sources." In order for this to happen though there need to be mechanisms for people to be able to find and use the content.

Education, and e-learning within it, encompasses such a range of creative and human activities that many standards are going to be needed, cognitive, pedagogical, technical, accessibility, disciplinary. If e-learning standards are to support this vast creative complexity then they need to be more than a means of

demonstrating compliance or supporting technology (Marshall, 2004a). Standards must support the development of e-learning capability across entire sectors of tertiary education, rather than encouraging piecemeal and isolated initiatives. The author is of the opinion that unless standards are developed in an open way that enables learning, not only for students, but also for institutions and teachers, most elearning standards will be a strait jacket of compliance and rigid management which will be lost in a history of forgotten and ignored 'fads'.

To secure long-term investment and sustainability there is a need to consider reusability. The more a costly digital production is used, the better its return on investment for the institution, thus paying for its creation. This opens opportunities for selling and trading online learning products and services, including non-commercial open content publishing along the lines of Open Course Ware (OCW). But, as Greller & Casey (2007) admits, modular content standards are not enough to guarantee reusability of learning content, and initiatives to standardize context and process descriptions are to date still not mature enough to be usable by a broader than the specialist community.

Wood & George (2003) outlined an approach to quality assurance in online teaching and learning, which actually has been developed by the University of South Australia. They have described the development of a checklist and supporting website, in which shared understanding about the scholarship of teaching and learning in resources developed for online delivery is made explicit. The authors determined that this approach involves the development of a review tool comprising a paper-based checklist of agreed good practice and supporting website focusing on four areas – instructional design, interface design, use of media and technical aspects. According to them, the review tool provides an opportunity for just-in-time academic staff development by providing the accepted standards, information about how to meet these and examples of good practice, as well as providing a framework for involving other academics in the process of peer review.

Alves & Uhomoibhi (2010) investigated the issues related to e-learning standards and identity management and critically examined existing e-learning standards and the tools and processes applied to managing the identity of learners registered for programmes of study in higher education. The authors argue that the creation of identity management federations is mandatory to provide the mobility of users and to permit the exchange of contents and services between institutions. It was revealed that it is crucial to create identity management federation to provide for ease of mobility and facilitate collaboration and sharing information amongst staff and students in higher education. Also the challenges arising from language, culture and differences in systems for the regions require consideration

A preliminary assessment of the adequacy of existing e-Learning standards for supporting the introduction of adaptation techniques in e-Learning systems was done by Paramythis, Loidl-Reisinger & Kepler (2004). Their analysis pointed out that existing standards do have some provisions for adaptation, but require substantial extensions to accommodate common practice in ALEs. Also, Standardization at the level of adaptation components and services has only recently been addressed in the context of research efforts. It is argued that extensions to standards / specifications should happen in a way that keeps the "entry cost" of employing adaptation facilities in the development of e-Learning materials, to as low level as possible. The authors opined that it is important that future extensibility of (new or enhanced) standards is seriously taken into consideration.

It is important to emphasize the fact that learning technology standards implement a certain level of interoperability (Varlamis & Apostolakis, 2006). The authors argue that in order to achieve the smooth co-operation of all e-learning components we should impose standards in every procedure. According to them, a major complaint about e-learning standards is that products claiming conformance do not work together without further tweaking. This translates into lost time and expensive service engagements. As a result of this challenge, there is an increasing emphasis on developing conformance tests

and certification programs. They feel it is necessary that e-learning standards must be adopted by everyone without any customization or modification.

Jayal & Shepperd (2007) presented a summary of various e-learning standards in order to make them more accessible and understandable, and provide preliminary evidence as to their utility and adoption by the various UK higher and further education institutions. They have focused on eight emerging standards on the basis of their influence in e-learning. They discovered that the proliferation of standards and standards bodies is problematic, leading to unnecessary complexity and there is a significant overlap and differences between standards. They have recommended a need for explicit provision for automatic marking / assessment of subjective text based answers and quality parameters in component interfaces. They took only one UK higher education institution, because of which the results cannot be generalized over the whole higher education community.

Marshall (2004b) in his study casts a critical eye over current developments and suggests closer attention to the role of standards in improving quality and supporting teachers and learners rather than constraining them. He opined that standards must reflect the diversity of student learning capabilities and desired outcomes, and must evolve to meet the challenges of new forms of technology, and new types of pedagogy, and ideally they should stimulate the discussion, application and research that result in that evolution. He further suggests that standards activities need to acknowledge the learning context more explicitly, if they are to inform and support learning rather than just standardize it. Unless, clear models of success, which can be used as generic exemplars, are identified, teachers and institutions are left groping blindly and by instinct for how to use e-learning effectively in the context of their students' needs.

Sicilia & Garcia (N.D.) submits that the use of formal ontologies to describe reusable learning objects provides a better support for the development of 'intelligent' tools, since the semantics of ontology definition languages are richer than those of RDF and also of simple information structuring XML schemas. But widespread adoption of ontology-based learning objects would

not come without a cost, since a significant effort, and novel tools and metrics would be required to properly annotate an organization's knowledge assets, to a level of detail that enables their automated handling. They have stressed on the use of LOM (learning object metadata) into formal semantic descriptions. According to the authors, more comprehensive learning object specifications, including the description of learning process, should be addressed in the future, as part of a far reaching research agenda that has been outlined elsewhere.

2.5 E-LEARNING COURSEWARE

Library literature approaches the problem of integrating resources into course paces from various angles. Some of the literature focuses on specific issues of electronic reserves, methods of linking to resources, or incorporating tutorials within the course space environment.

John Shank divides librarian efforts to incorporate resources into online courses into two distinguishable categories – librarian involvement at the macro-level, and involvement at the micro-level, depending on the librarian's role in the development of the course and degree of interaction with the courseware software. Involvement at the macro-level is characterized by a "generic, global presence (Shank & Dewald, 2003). This would be equivalent to establishing a link to the libraries' web page and online catalog. Information on these pages is updated independently of the course software, so no updating or editing within the courseware is necessary. Working at the macro-level is highly scalable. However, a "generic, global presence" does not provide any opportunities for targeted instruction or links specific to different research projects or assignments.

Sung & Chang (2007) tried to monitor the e-learning quality in order to ensure effectiveness of e-learning courseware. Although establishing a mechanism for certificating e-learning quality has became an important method to monitor and manage e-learning courseware. Using 44 courseware from initial inspection and re-examination in version 1.04 as the sample, the results indicated that the difficulty value of most items (38%) were between .60 and .70. The interviewed data were analyzed and according to the grounded theory, the

certification system can serve as a valid and reliable gate-keeper of e-learning materials. Most e-learning courseware under the certification system demonstrated medium to high quality, especially when the design was revised.

E-learning courseware may be thought of as a salad bar, offering a menu of options sufficient to meet individual preferences: various lettuces, tomatoes, carrots, radishes, cottage cheese, strawberries, peanuts, and peaches. The challenge for faculty lies in selecting from among the variety of e-learning options the most appropriate methods to feed the hunger for learning and the passion for teaching of many different types of students and instructors (Donohue & Howe-Steiger, 2005). E-learning will have a place in the academy of the future whether one accepts it or not. Establishing a new tradition of written collaborative agreements that use existing copyright law to design rewards and frame relationships reflecting the unique culture of the academy will help administrators attract the attention, creativity, and involvement of their faculty—their core intellectual and instructional resource—in the exploration and effective development of e-learning courseware.

Hanisch (2000) has specified that strictly separating structure, content and design is a key towards easy creation, modification and extension of courseware. A generator component creates the entire courseware automatically from its content, structure and design information, then comes solving the problem of providing the user interface for data input. In the case of web-based courseware, authors should be enabled to input core data online - right on the spot. Courseware will also have to include elements like virtual experiments that allow interacting with all essential parameters of a topic and visualizing all essential relationships properly. The needs for interactive, hypermedial courseware as well as for their rapid development and easy enhancement imply the development of problem-based authoring and programming tools. The basic requirements for such tools are interdisciplinary. The author has described general concepts to meet the task of providing international, consistent, adaptive and highly interactive content.

When designing for pedagogical-based courseware should consider perspective of pedagogy in e-learning context and is usually corresponded to three theories of behaviorism, cognitivism, and constructivism (Monsakul, 2008). It also involves pedagogical work of Chickering and Gamson's seven principles for good practice in higher education. The author finds that in higher education, e-learning courseware depends on two major phases; first, the designing phase which involves three main theories of e-learning, including behaviorism, cognitivism, and constructivism and second the development phase in which a courseware is considered as an e-lecture, or virtual lecture, which is alternative to traditional lectures in e-Learning context.

According to Khan (2004), in e-learning process, people are involved in creating e-learning materials and making them available to a specified audience and keeping the role of people in mind, khan has given his P3 model which can be used to map a comprehensive picture of e-learning. The author has tried to identify various roles and responsibilities involved in e-learning. Some roles and responsibilities may be relevant to specific stages of the e-learning process. He feels that individuals involved in various stages of the e-learning process should be in contact with each other on a regular basis and revise materials whenever needed. The E-Learning P3 Model provides a comprehensive picture of the e-learning process and helps to identify the roles and responsibilities for the design, development, evaluation, implementation, and management of all e-learning and blended learning materials and systems.

Stoel & Lee (2003) tried to find out the student's acceptance of e-learning courseware. The authors are of the opinion that longitudinal exposure to courseware increases student perceptions that the courseware is easy to use, increasing positive attitude towards the technology, and in turn increasing intention to use the technology. Among the three usage variables included in the study, frequency of WebCT usage was the most powerful outcome of the intention to use. This study also suggests that university course designers, namely instructors, should stress the ease of use and usefulness for their web-courseware. In addition, providing contact information for technology help

may also influence perceptions of ease of use. Therefore instructors who intend to use the web-courseware as a technology assistant should fully and strongly emphasize the usefulness of the courseware.

Pankratius, Stucky & Vossen (2005) have proposed solutions to problems related to the maintenance and update of already existing e-learning courseware. They took a structured approach in form of a reference model for the re-engineering of existing educational material and according to the authors, software product lines for e-learning material provide a global framework for coordinating the re-engineering and reuse of components. They argue that the maintenance of learning material in educational as well as in enterprise environments has been underestimated and vastly overlooked in the past and this problem is to be solved due to the re-engineering approach as the absence of single dominating standard for the exchange of educational content, as well as the missing economic incentives for interoperability are missing.

According to Lewis (2007), faculty who participate in courseware and online education development must possess skills and techniques in incorporating design, technology, pedagogy, and communication to provide online instruction in an effective manner. While some faculty personally seeks out development opportunities, the institution's role (perhaps even responsibility) in preparing the faculty to teach online should not be overlooked. Without schools providing support or making available resources for faculty to develop their web-based instructional skills, institutions risk not meeting the needs and interests of the faculty as well as the students. From a General Systems Theory point of view, failing to adequately address faculty performance can have a considerable impact on the organization as a whole.

2.6 E-LEARNING IN HIGHER EDUCATION

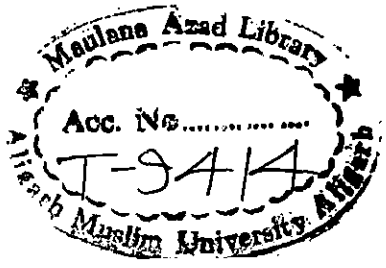
Education has become a commodity in which people seek to invest for their own personal gain, to ensure equality of opportunity and as a route to a better life. As a result, providers of Higher Education are finding themselves competing more than ever for students, funding, research, and recognition within the wider society. During the last decade and through the development

of virtual education i.e. distance methods of delivery and new communication methods, higher education has become internationalized; providers are able to export themselves and as a result competition has been extended beyond national boundaries. Following this extension, various opines of authors have been listed as under:

Institutions of higher education are increasingly embracing online education and the number of students enrolled in distance programs are on the rapid rise (Bonk & Kim, 2005). The higher education survey by the author indicated that there will be enormous growth in online certification and recertification programs, associate and master's degrees, and blended learning. It further revealed an interest in wireless technologies, simulations, digital libraries and reusable content objects among the students, scholars and professors. According to author, the explosion in online learning will bring increased attention to workshops, courses and degree programs in how to moderate or mentor within online learning. The study provided a glimpse of the pedagogical as well as technological possibilities.

Due to the vast cultural and social diversity in India, it is difficult to change the social background of students, parents and their economical conditions. Government is providing elementary and primary education at no or negligible cost. There are enough schools, teachers and facilities for students and teachers, but still there is a great variation in the quality of education due to the social background of students, parents, different standards of teaching and teachers training programs (Pawar, N.D.). Therefore in the author's point of view, the only options left for India is to provide uniform or standardize teaching, for high quality education throughout India there must be some nationwide network, which provides equal quality education to all students, including the students from the rural areas and villages. The solution to this is Web-Based Learning resources or methods.

E-learning could be a highly disruptive technology for education - if we allow it to be (Laurillard, 2004). We should do, because it serves the very paradigm shift that educators have been arguing for throughout the last century. New



ways of learning require new forms of institutional management and if universities are to rethink their methods of teaching, they need a management structure that is capable of supporting innovation. We need systems capable of continuously reconfiguring themselves to create new sources of public value. This means interactively linking the different layer and functions of governance, not searching for a static blueprint that predefines their relative weight. The author finds a need to find a way of creating the common infrastructure of agreed standards of interoperability that enable, and do not frustrate innovation.

E-learning could be embedded in higher education but it requires an understanding of how it fits into organizational strategy and its incorporation into departmental and other operational plans. The cultural changes required affect teaching, support, administrative and management staff. Staff development needs to be embedded in the "production process" and the processes of changing policies and procedures (Stiles, 2004). However, the author has stressed that relationship to policy and procedure, administrative and management staff must be involved fully in this process and embedding must imply senior management commitment to real change at strategic and operational levels.

The Humbold tradition during the 19th century promoted culture and civilization, a holistic idea of human beings as the ultimate goal of higher education. This vision was replaced in the late 20th century by the idea of centres of excellence which are highly specialized but rather narrow in their approach to knowledge (Varis, 2006). On the basis of three principles, success of e-learning in higher education can be verified. First, the institution must demonstrate how it will achieve its goals. Second, the assessment should provide assurance that standards of quality are successfully maintained at an appropriate level regardless of the medium of the course or the methods of instruction adopted and thirdly, the responsibility for the conduct of assessment should be appropriately delegated and shared.

The number of new Virtual Learning Environments (VLEs) is increasing and they have been advertised as being a solution for remote and cross-border education. This is extremely important when the tasks cannot be practiced in real life. (Koskela et al 2005). The authors found VLEs feasible for higher education. A good feature of VLEs is that students can themselves control the speed of studying. The VLE students appreciated this feature. However, authors suggest that VLEs must be used with caution. VLEs must add something special to the course or the subject. VLEs have been proved to be particularly successful in so-called introduction courses. In order to get good learning results with a VLE, they need to be designed well and the needs of the user group must be considered thoroughly.

However, further looking at the use of learning objects in higher education, the author opined that learning objects are still in its introductory stages, more so in some disciplines than in others. Most of the disciplines using learning objects are, not surprisingly, in the natural and physical sciences, computer sciences, and medical sciences, such as nursing. There are some barriers that still exist to creating and/or adopting the use of learning objects. Either it is difficult to integrate it in CMS or there is a lack of a pedagogical model that suggests best practices, ownership issues and lack of collaboration (Griffith, 2003). The author is of the opinion that learning objects are best suited for online asynchronous learning but could be adapted for hybrid classes as well as for lecture presentations. Institutions of higher education must take into account the potential stress generated by embracing the new technologies when change is not well informed and/or well paced.

One vision of the future of universities is that Virtualization and remote working technologies will enable us to study at any university in the world, from home (Mackeogh &Fox, 2009). Universities will have to introduce strategies and policies which implement flexible academic frameworks, innovative pedagogical approaches, new forms of assessments, cross-institutional accreditation and credit transfer agreements, institutional collaboration in development and delivery, and, most crucially, commitment to

equivalence of access for students on and off-campus. In developing this e-learning strategy, it is vital to (a) have a clear vision of desired outcome (b) an understanding of the current capacity and attitudes of the relevant staff and (c) a coherent set of steps to move from the current situation to the desired outcome. Next steps include adopting a series of actions designed to enhance e-learning capacity through awareness raising, training, funding flagship programmes, and adopting mandatory credits of online learning in all programmes.

Catherall (2004) notes the fact that more people than ever are going to university today, but many students now have to face financial difficulties, as well as feeling compelled to gain more marketable skills. All this has led to a demand for more core study skills and flexible approaches to support course delivery in a low-contact study context. The author argues that one of the most important characteristics of e-learning lies in the fact that many systems endeavour to provide an interface that is both intuitive and usable. Furthermore, there is the 'e-tutor', whose role encompasses a wide range of activities, such as e-learning management interface to upload course materials, managing user access to online courses and interacting with students via communication features.

2.7 E-LEARNING IN LIS EDUCATION

Like most other institutions libraries are also facing dramatic changes in its dimensions. Particularly, the growing use of ICT in library activities is enforcing many changes. Kumbhar (2009), stressing on the use of e-learning in LIS education, advocates that in most of the Indian libraries, staff working there are not well convergent with ICT because the ICT came long after they had their education and e-learning is the most suitable teaching-learning method for imparting education on the modern terminology. Besides it will increase the expectations from employees as well as users. The author opines that e-learning can impart education according to the job-specific needs, improves image of the teaching profession providing more content within short duration and will make it possible to change with time and technology.

Understanding the impact of e-teaching, e-learning and e-education is seen as fundamental to moving us forward so that we can make greater use of the opportunities provided by the Internet (Sen, 2009a). The author finds e-Teachers as central to the move toward e-education and the way in which ICT is integrated in the academics. According to the author, an initiative must be taken in academic libraries which will develop e-learning smart classrooms, along with video conferencing and assignment tools enabling flexible learning and teaching with the students studying at their own place. Further the academic library must have a holistic approach in e-learning whereby different traditional and digital methods and media are integrated in learning and teaching. An academic would be wise to undertake an assessment of the learning and programmatic outcomes it hopes to achieve through e-education and according to her, including e-teachers in this process will ensure that the pedagogy, staff development and budgetary concerns are viewed with due consideration.

Further verbalizing the role of academic librarians in e-teaching and learning, Sen (2009b) says that modern librarians are a part of e-learning process and provides online and in person modules, guides, subject and class based lists, as well as reference. In her opinion, the librarians should play a dedicated role in supporting instructors and administrators to realize the potential of e-learning through the provision of service models unique to libraries. There must be a blended approach to information literacy which will offer students and instructors with an ability to address diverse learning styles and encourage active participation along the presentation to a 24x7 access that may foster increased student contact with the librarians.

Networked technologies are facilitating learning, anytime and anywhere. The prospect for online LIS education in India seems to be very encouraging but there are many challenges towards it (Naushad & Samar, 2006). The authors, while highlighting some of the objectives of LIS education in India, lay equal emphasis on embracing new frontiers of librarianship as Library and Information Science has made its own impression in India by starting various

courses in an online environment. However, lack of infrastructure, absence of accreditation body at national level and lack of finance are some of the major challenges and issues that LIS education system is facing.

Many libraries are in the process of delivering information services and resources through online chat rooms, e-mail services, list servers or free online databases and reference services, teleconferencing and toll free numbers (Vatnal, Mathapati & Prakash, 2004). According to authors, library services can be developed in e-learning environment when the students at remote sites will get information resources supporting their learning by the formation of digital libraries which can help in effective searches. Along with the access, consultation services, references services, inter-library loan and consortia sharing will contribute in effective and judicious use of library materials, in turn making it possible for libraries to raise and grow in e-learning environment.

Developing inter-institutional collaborative agreements for online education offers the potential benefit of increasing participants' access to resources and decreasing costs to institutions (Montague, 2005). Giving the account of only 55 LIS schools in United States and Canada, the author finds it a challenge for faculty and staff to reach-out to those who are unable to relocate to pursue studies on-campus. According to 2003 Association of Library and Information Science Education (ALISE) Statistical Report, 88% of schools offer courses via distance education (including online, video-conferencing, and off-site delivery). In 2003, WISE (web-based information science education) consortium pilot project was started and as per the viewpoints of students, they find it more interesting with opportunities to take classes in different formats, thus proving that e-learning in LIS education will endure and prosper in future.

Singh & Devi (2009a) aver that ICT has not only affected operations of library services but also LIS education. So there is a need to integrate the qualitative changes in the LIS Education. They feel that proper utilization of educational technology for imparting courses can produce better results and as per them, it has become essential to consider the utilization of virtual learning environment

in LIS education. One of the most important activities concerning learning in virtual environment is the access to web resources.

The e-learning environment has ushered new avenues for libraries to blend their traditional resources and services with electronic ones to meet the information needs of wider clientele (Pujar & Kamat, 2009). According to them, the psyche of librarians regarding the technology as "cutting the mustard" needs to be changed. This might be possible with changing the recruitment profiles for the librarians and/or by incorporating more technology-based components in today's bachelors and masters program of library and information science. There is no doubt that the winds of e-learning are forcing the libraries and LIS community to lead towards the Library 2.0 movement. In order to achieve the goal of Library 2.0, there is a need of common exploration by academicians, e-learning experts, and library professionals.

Singh & Devi (2009b) highlighted that LIS education has undergone rapid expansion in the area of ICT but learning in virtual environments are giving rise to many issues and challenges. They find it feasible to introduce new courses based on ICTs in different schools to face the challenges. However, some of the issues presented by them like the need for learners to be trained in handling of new media, teachers training, courseware development, and equal access to technology are necessary to consider for effective implementation of web-based learning in LIS education. They opines that web-based mode of teaching has become an important component of LIS education in India and that is why many organizations like IGNOU, IATLIS, IUC-TEFED, Nodlinet etc. are coming up with the initiatives for providing virtual education.

2.8 DISCUSSION

Web-based learning continues to be seen as a viable avenue by many institutions to supplement institutional goals, it is important to understand how institutions support faculty as they embrace the web-based instructional environment. It is clear from the literature that the ultimate potential of online technology to enrich higher education resides less in the technology itself than in the practices and discourses that it prompts individually and institutionally.

By understanding how institutions of higher education are preparing and supporting web-based classes, the information can be utilized to help further develop human expertise in the area of web-based instruction with the purpose of improving performance. The literature has demonstrated that an e-learning service infrastructure that is based on reusable multi-media learning objects, and advanced e-learning technologies that support collaborative, adaptable, flexible and customizable learning are the keys to realize this vision. The developed tools and software system components can be replicated and installed at many websites to enable the establishment of many virtual e-learning communities for knowledge sharing in different problem domains.

In India, e-learning is seen as the future of education. At present, it just supplements traditional learning methods rather than replacing them. The probable reasons for that are lack of finance, inadequate infrastructure including software and hardware access, lack of technological expertise, nature and level of courses to be designed and offered, instructional delivery methods, required faculty, accessibility and affordability of technology from the learner's side, evaluation methods etc. But the prospect of online LIS education in India seems to be very encouraging. Tremendous growth of personal computers, expenses of regular professional courses and increasing network from the home, office and public places will lead to the development of Internet based learning as a cost effective and convenient educational method. Learning systems will play an important role in future in delivering education in remote parts of the country, provided an improvement of infrastructure facilities and support systems is done to meet the needs and expectations of the students.

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Chapter-3

E-Learning in LIS Education

CHAPTER-3
E-LEARNING IN LIS EDUCATION

"The biggest growth in the Internet, and the area that will prove to be one of the biggest agents of change, will be E-Learning. ...

~John Chambers,
CEO, Cisco Systems (1999)

3. E-Learning: A brief Description

E-Learning, which is short for electronic learning, is defined broadly by web-technology professionals as education and training delivered by an instructor or self-paced from a curriculum database stored on the enterprise local area network (Berry, 2000). It refers to anything delivered, enabled or mediated by electronic technology for the explicit purpose of learning (Hicks, 2000). It offers the possibility of learning from information delivered to us electronically (Honey, 2001). It is a web-based, personal learning experience and provides measurable results (Rich, 2001). The broadest definition refers to any distance-learning mode other than a corresponding course with printed material. The clearest definition of e-learning is that it refers to the use of internet technologies to deliver a broad array of solutions that enhance knowledge and performance. Solutions are networked, which means instant updating, retrieval, distribution and delivery to computer users at standard Internet technology (Rosenberg, 2001a). E-learning applications include self-study, instructor-led web-based training, knowledge management and performance support (Broadbent, 2000). The value of e-learning according to Govindasamy (2002), in the context of e-training, does not lie in its ability to train just anyone, anytime, anywhere but in training the right people to gain the right skills or knowledge at the right time.

Before the dotcom explosion, many analysts predicted e-learning to rapidly become wide-spread and account for the bulk of higher education and corporate training. Analysts predicted e-learning would account for 90% or more of training in 3-4 years. That prediction did not materialize. The timetable

has since pushed out, but analysts think that it will still happen (Piskurich, 2003).

E-learning is frequently discussed in the context of asynchronous, synchronous and blended learning. Asynchronous learning allows the learner to have access to the content material anytime and anywhere, at his convenience. E-learning provides a choice of self-paced study which means that the learner has the choice of when and where to take the lessons (Beamish et al. 2002). The content can be segmented into small modules and the learner can select what modules he wishes to learn. Depending upon the availability of training time, the length of the module can be adjusted accordingly. Most self-paced e-learning allows learners to pre-assess their knowledge so they can focus on areas needing improvement. In contrast, in a classroom environment, the speed of the instructor might be either too fast or too slow for some learners (Hartley, 2001).

Synchronous learning is online virtual classroom learning that allows lectures, discussions, and collaboration to be done via web for users from geographically dispersed areas with no separation of time. The users can participate online with a live instructor and other learners. But unlike the self-paced asynchronous learning that can be accessed at anytime, the real time nature of asynchronous learning with the real time participation of the instructor requires that all learners join at a predefined time. It is closer in format to classroom training, which thrives on real time interaction (Oakes & Rengarajan, 2002).

Blended learning is a combination of the best features of e-learning and classroom learning (Voci & Young, 2001). IBM's Basic Blue is an example of a blended learning application where a leadership development program trains managers worldwide. It combines extensive e-learning modules with online support, coaching and collaboration.

The choice of method varies on the content and speed required for training. If high level of interactivity is required for training in negotiation skills, e-learning might not deliver the desired level of equivalent interactivity that face-to-face training would provide. Group interactions, culture building, and

teamwork are all critical attributes of an overall learning system that is still frequently best suited for classroom experiences (Rosenberg, 2001b).

E-Learning can result in improved performance, greater speed to market, increased operating efficiency, higher retention and greater return on investment (ROI). Benefits can be savings achieved in comparison to existing training programs. Benefits can also come from the ability to perform in a new way previously not available.

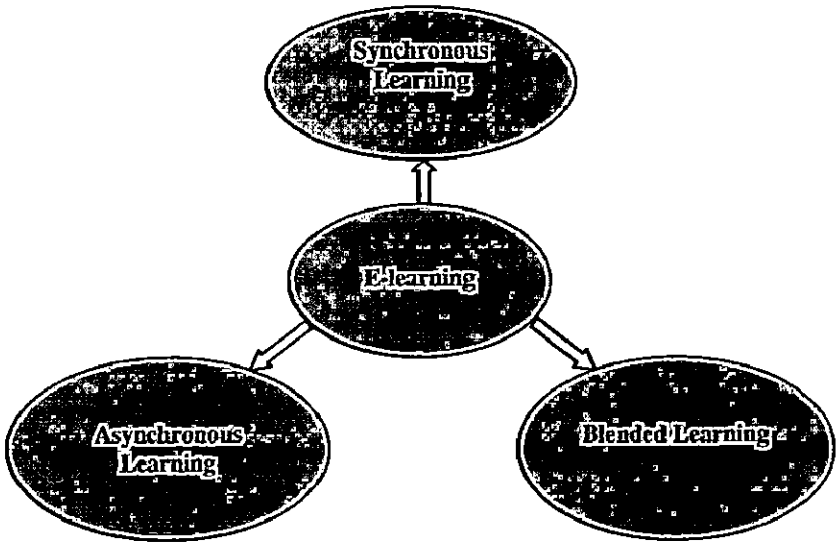


Figure-1: Learning Model by Haitham A. El-Ghareeb

Effective e-learning means different for different organizations and each organization has its own way of measuring the effectiveness of e-learning. Effectiveness in performance can mean quality, quantity or a new way of teaching. It means the benefits of e-learning are outweighing the costs of resources required for implementation. E-learning can result in improved performance, greater speed to teach, increased operating efficiency, higher retention and greater return on investment (ROI). Benefits can be savings achieved in comparison to existing training programs. Benefits can also come from the ability to perform in a new way previously not available.

There are four levels of evaluation, which include: (1) the effectiveness perceived by a trainee; (2) as measured by learning evaluation; (3) as observed performance improvement; (4) as teaching impact. Level 1 is a survey of

learner satisfaction. Level 2 is an examination of the content to make sure the learner has mastered the content of the training module. Level 3 is an observation of learners translating their knowledge into workplace performance. Level 4 measures return on investment.

Effectiveness can be undermined in a number of ways: at the learner level if he is unprepared and lacks motivation and time; at the teaching level if the content is not engaging, relevant and useful; and at organizational level if institutional support structure is absent. E-learning strategy should address issues of technology, learning effectiveness, culture, leadership, justification, organization, talent and change (Rosenberg, 2001c).

3.1 E-Learning Definitions

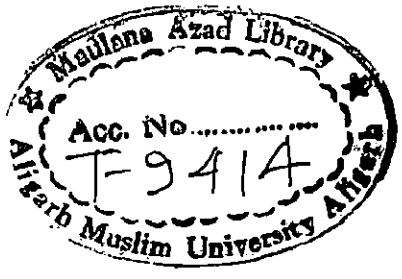
Although there is globally varied connotation of E-learning as some people call it electronic learning, while some prefer to recognize it as online learning, virtual learning, computer-based learning and web-based learning. Nevertheless, due to its broad spectrum of coverage E-learning has been variously defined by number of organizations, commissions and authors. The notable among which are encapsulated here under:

International Business Machines Corporation (IBM, 2004) defines E-Learning as "the use of innovative technologies and learning models to transform the way individuals and organizations acquire new skills and access knowledge."

Webopedia (2012) defines E-Learning as "the network-enabled transfer of skills and knowledge. E-learning refers to using electronic applications and processes to learn. E-learning applications and processes include Web-based learning, computer-based learning, virtual classrooms and digital collaboration."

Ruth Clark (2002) defines E-Learning as "content and instructional methods delivered on a computer (whether on CD-ROM, the Internet or an intranet), and designed to build knowledge and skills related to individual or organizational goals."

Elliott Masie (2003) describes E-Learning as "the use of network technology to design, deliver, select, administer, and extend learning."



Commission of the European Communities (2001) defines E-Learning as "the use of new multimedia technologies and the Internet to improve the quality of learning by facilitating access to resources and services as well as remote exchanges and collaboration."

1st National Conference on E-Learning (2002) defines "Electronic learning or E-learning as a generic term for all electronically supported learning which includes an array of teaching and learning tools that use electronic media including phone bridging audio and videotape, video teleconferencing, and satellite broadcast. In recent years, the term has been delimited to Web-based or online courses that make use of electronic mail; video conferencing, discussion boards, chat rooms, and electronic whiteboards on the Internet."

MacMillan Dictionary Thesaurus (2012) defines "E-Learning as the methods of learning that involves the use of computers and the Internet."

E-learning Glossary (2012) defines E-learning as "a method that utilizes available technologies to facilitate learning. This method of learning utilizes networks to deliver learning content, enable interaction between users, and generally facilitate the learning process from both teacher and student perspectives. E-learning employs written, audio and visual content to deliver learning content that can be accessed with a computer anytime anywhere."

E-learning Forum Romania (2004) defines "E-learning as a planed teaching and learning experience organized by an higher education institution, which supports learning process through internet in a sequential and systematized order to be achieved by students in their own pace.

3.2 Why E-Learning?

In the fierce global competition, compression of time, expansive territory, and demand for just-in-time learning, the streamlined workforce, fiscal concerns and the rapid movement towards a digital society, e-learning can be an essential component of a higher learning to achieve strategic goals and competitive advantage. The increasing demands for continuous, flexible lifelong education and the availability of increased bandwidth of more power

communication technologies are stimuli for extensive developments in e-learning (Clarke & Hermens, 2001).

The web is one of the most important and prevalent current technologies. Its use as a means and method of delivering material for leaning is likely to have a greater influence on learning than all the developments in instructional technology of the past 30 years (Alessi &Trollip, 2001). Since the web is not only used to enhance teaching and learning in the traditional face-to-face environment, but also supports distance learning and teaching by enabling learners to communicate both synchronously and asynchronously. Such means of teaching and learning have captured the interests of educators worldwide. Educators from all levels of teaching are rethinking the very nature of teaching, learning and educating due to the existence of web-based learning environments (Owston, 1998).

According to a UNESCO report there are several global forces that are serving to raise the sense of urgency: i) World population in 2015 will be 7.2 billion, up from the current 6.1 billion. Ninety-five percent of the increase will be in developing countries. People in most countries will live longer, which will add to the demand for access to education and other services. ii) Globalisation, the unrestricted flow of information, ideas, cultural values, capital, goods and services, and people, will enhance not only the demand for education, but create need for more diversified content and greater flexibility of access (CIA, 2000; UNESCO, 1998).

However, two trends running parallel to the globalisation process will have a significant impact on the development of global systems of virtual education. These are the creation of more small and medium-sized enterprises and an increasing desire to defend cultural, linguistic and religious identities. Each of these trends complicates inter-institutional collaboration and mitigates against the flow of globalised content across borders.

Cunningham et al. (2000), in the comprehensive analysis *The Business of Borderless Education*, identified the following forces as driving the growth of what they called the "alternative education market" in those jurisdictions:

(a) The globalised economy, with a growing demand for standardised products, services and technical infrastructure, and sophisticated communication systems.

(b) The emergence of a post-industrial information age and the explosive growth and distributed nature of new knowledge.

(c) The demands for greater access to tertiary education fuelled by rapid changes in the economy, the need to maintain and upgrade skills for employment, and industry's demand for "work-ready" graduates.

(d) The growing reluctance on the part of governments to fund the increasing demand for higher education.

The educational strategies that are being deployed in response to these forces are described with various names, that is, "Virtual education," "distance education," "distributed learning," "online learning," "Web-based learning," "e-education," "e-learning," or any one of a number of other labels. Current strategies typically involve the use of digital networks, either synchronously or asynchronously, for the delivery of courses, the management of administrative services as well as the provision of learner support services. This phenomenon is further buttressed by a recent report issued by the American Council on Education (ACE). It states: "The new e-education force transforming higher education may not be controlled by the traditional structures or providers of education or by traditional academic policies. Not only do the new forms of education portend a change for student populations, but also they will force faculty to develop new modalities of teaching and administrators to provide a new infrastructure for support".

Consequently, the advent of e-learning is forcing many institutions to review and amend many of their existing policies and procedures. This is because currently there is a strong move naturally towards integrating computer assisted learning technologies (CAL) into the education curriculum (Dearing et. al., 1997); much of which has been motivated by the view that e-learning offer many educational advantages over traditional teaching. Thus, due to the growing and diversifying demand for higher education, increased competition

and globalisation, there is the need for higher educational institutions to outline clear and comprehensive strategies for ICT in relation to the types of technologies to use as well as make appropriate choices about the markets they can and wish to serve.

However, the actual influence of these external conditions is determined by the way in which the internal actors perceive the changes in their environment and their ideas about future trends. But the current situation points to a gap between vision and reality or that the "Virtual University" works in theory but not in practice. Many higher educational institutions are still struggling to overcome the "pioneer" phase, while trying to move into a phase of more mainstream engagement. In order to be successful, indeed, the commitment of some dedicated individuals will not suffice; the institution itself must make a commitment (i.e. for support, resources and personnel) as well as develop a targeted implementation strategy. Therefore, there is the need for internal and external factors such as faculty or staff members, students and policy makers to know more about the implications of technology use. For instance when one examines faculty use of e-learning though the availability of IT is becoming common, little is known about the actual extent of higher educational instructors' access to and use of the Internet and other telecommunications technologies.

Recent surveys of academic-computing officials at over 500 post secondary institutions in the United States have shown that more than 40 percent of senior IT officials believe that their top priorities, and biggest challenges, are getting faculty to work with technology and helping them to integrate technology with instruction (Green, 2001). As the typical college has doubled it's spending on information technology services over the past 10 years, it becomes increasingly important to know whether or not postsecondary faculty are using electronic mail, the Internet, and Web sites for instructional purposes. For example, a recent forum on technology use in higher education found that, due to a pervasive scepticism among faculty and administrators about the quality and effectiveness of online research and teaching, established professors were more

inclined than their untenured counterparts to use information technology in teaching (Kiernan, 2000).

Thus, summarising this phase of my discussion, one could realize that there is a great need for effective e-learning in order to promote self-regulated learning through appropriate methods and to provide greater flexibility and timeliness which can suit educational needs at any time especially where traditional classroom-based learning is disruptive.

3.3 Key drivers of E-learning

3.3.1 Economic Drivers

(a) Profitability: Spurred on by goals of cost-effectiveness and competitiveness, today's organizations and institutions look at e-learning as a means of reducing costs associated with traditional training especially travel and lodging expenses. Based on results from a survey on e-learning, W.R. Hambrecht (2000a) suggests that two thirds of training budgets are allocated to travelling costs alone. Both lack productivity caused by students being away from their place of work and travelling costs represents areas for improvement of the efficiency of training.

(b) Globalization: The widening of the free education movement is stimulating the international expansion of institutions leading to larger, more complex organizations employing vastly distributed workforce across the globe. Attempting to deliver training to their geographically remote and culturally diverse workforce, organizations are using e-learning to deploy time and cost efficient as well as adaptive training solutions. A survey conducted under the aegis of Corporate University Xchange in 1999, estimated that the proportion of instructor-led training will decline from 80% to 60% by 2003, while e-learning will double from 20% to 40% in the same timeframe (Hambrecht, 2000b).

3.3.2 Technological Drivers

(a) Ubiquity of ICTs: The burgeoning growth of e-learning is not only related to economic factors but to access too. According to the conference board, Canada is ranked second in the world behind the U.S. for its "connectedness"

(Murray, 2001a), that is the number of homes and enterprises connected to the internet. By 2003, International Data Corporation (IDC) predicted that the number of internet users worldwide will expand to approximately 502 million, up from 87 million in 1997, which has risen to 1,971 million in 2010, representing a compound annual growth rate (CAGR) of 34%. The increasing availability of ICTs in the workplace and at home together with better technology infrastructure, especially for bandwidth, fuels the adoption of e-learning as a vector for training and education.

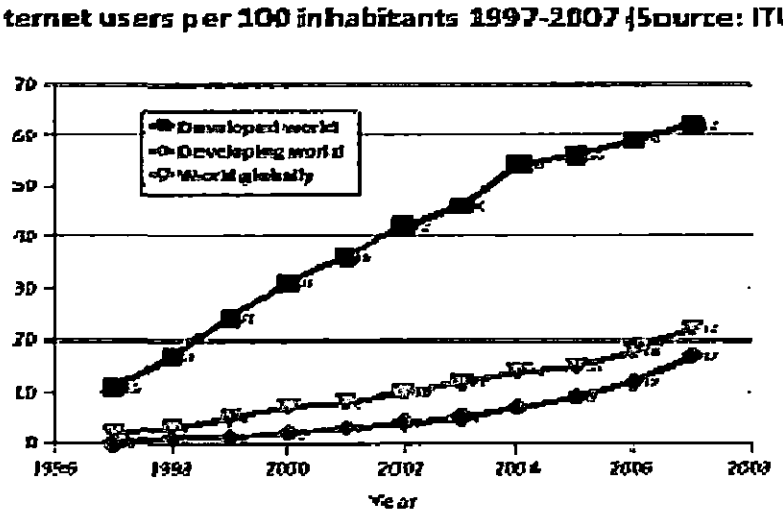


Figure-2: Internet Users World Wide

(b) IT skills and knowledge shortage: As organizations shift to more sophisticated technology like enterprise resource planning (ERP) systems ranging from administration, financing, manufacturing, R&D to marketing, products and services are churned out at an accelerated pace, and the skills and knowledge required to generate them need to be constantly updated. An estimated 30% of Canadian employers say their employees do not have currently needed skills of which many are associated with ICTs (Murray, 2001b). Higher penetration of ICTs in the workplace exposes a chasm between high demands in computer literacy, also known as e-literacy, and huge knowledge gaps in the workforce, a situation that organizations are attempting to address with increased training and the creation of corporate universities. Statistics Canada's 1999 workplace and employee survey reveals that

acquisition of computer technology is related to higher levels of computer-related training. The results indicate that 51% of workplaces that implemented computer technology also provided formal or informal computer-related training. As a result of the growing adoption of technology and the collateral emphasis on training, educational representatives are investing more and more in e-learning as a fast strategy.

3.3.3 Social Drivers

(a) Human capital development: A paradigm shift is at work as we move into the information age. In the industrial era, organizations' primary form of capital was physical and financial assets, but today's corporate values are increasingly defined through human, intellectual capital (Marsick & Watkins, 1999). More organizations are now aspiring to become "learning organizations" (Senge, 1994) where employees are given more power to make decisions and kept on the cutting edge of education and training in order to better contribute to organizational goals. Empowerment and up-to-date knowledge are becoming key factors in the quest for sustained growth of performance because individuals' commitment and creativity increases when they are closely involved in the decision making process and knowledgeable enough to make substantive assessments (Draft, 2000). As a result of this trend, organizations are implementing various training programs (e-learning and classroom-based) not only to prompt migrations towards an institutionalized participative culture, but also to support continuous development of learning.

(b) Lifelong learning: In parallel with the change of organizational paradigm, demographic evolutions steer the need for new approaches to learning. The U.S. department of education's statistics on attendance to higher education institutions suggests that students aged 18 to 20 accounts for less than 20% compared with students at 25 years old and more who have become the fastest growing group (U.S. Department of Education, 1997). These older, working, part-time students, who are seeking education primarily to further their career and augment their salaries, have to juggle with time and location constraints and demand flexible access to learning. This situation is echoed in many

countries including Canada, the United Kingdom and economic bodies such as the European Union who have recognized along with the Organization for Economic Co-operation and Development (OECD), "the urgent need to implement effective strategies for lifelong learning for all, to strengthen the capacity of individuals to adapt and acquire new skills and competences" (OECD, 1998). E-learning with its potential for course delivery at home and in the workplace is poised to accommodate a growing number of lifelong learners and thereby help shape a better-skilled workforce.

3.4 Pre-requisites and Application Scenarios for E-learning

By means of e-Learning, it seems that we have a new approach which meets all demands and provides a proficient way of learning by incorporating learning theories and combining them with new technological advances. Various analysts confirm this by predicting remarkable growth for e-Learning.

According to META Group (2002), within the next two years, 60 percent of organizations will deploy e-learning systems. Whether the training is for the marketing department, new employees, customers, consultants, partners, or IT workers, e-learning tools and practices have emerged as the medium for efficient transfer and management of knowledge across the extended enterprise. One of the key prerequisites for e-Learning (Sun Trust, 2002) is the growth and adoption of the Internet as its transport medium. International Data Corporation (IDC) forecasted in its report 1998 that there will be 320 million Internet users worldwide by the end of 2002. In the interim, this has been exceeded by far. According to Internet world stats (2010), more than 2,050 million users are online worldwide as of December 2010; more than 700 million hosts are available (Internet Systems Consortium). Several factors facilitate this significant growth:

- A large and growing support of installed computers in the home and workplace.
- Network protection, infrastructure, and bandwidth improvements.
- Advancement in the speed of personal computers and modem & xDSL performance.

- Cheap and more reliable access to the Internet.
- Consumer acceptance of online business.

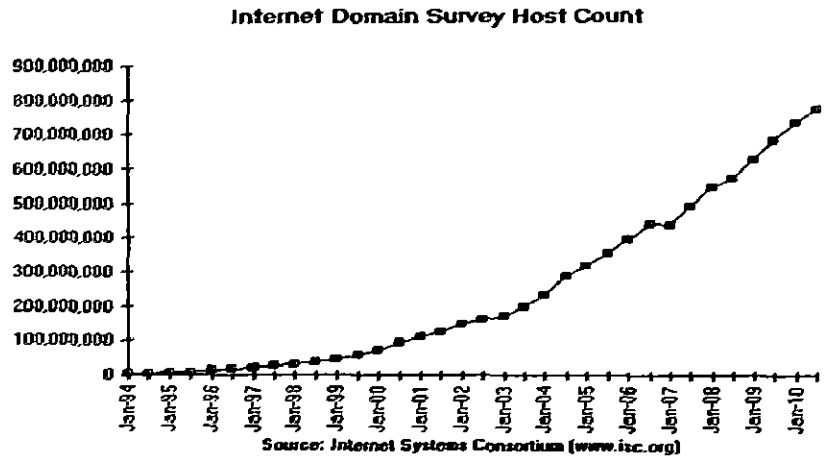


Figure 3: Internet domain survey host count (Jan. 2010)

Another prerequisite for a successful implementation of e-learning is the change of the learner's mind because the way of learning is so much different compared to traditional learning (e.g. learner-centered vs. teacher-centered) and offer other possibilities to add in the overall working or living process. In addition to that, there is no ideal way of using e-learning efficiently, because there are different application scenarios which require different approaches. Perhaps, e-Learning alone is not the best way, because it might be sensible to combine it with conventional instructor-led training, so called "blended learning" (the combination of different learning concepts and techniques). But, at the bottom line, I want to stress that e-Learning can help to improve the effectiveness of learning tremendously if done properly.

Main application scenarios where e-learning can be used are (Alsultanny, 2006):

- Primary, secondary and post-secondary education which include schools, high schools, colleges & universities.
- Virtual universities which provide access to (high quality) education otherwise not possible for some students due to time or spatial constraints or because it is too expensive.

- Bringing together students from different countries to better understand other cultures and prepare for the globalized world and ensure peace between nations. Distinctive subjects which are well suitable are e.g. languages, geography, history, biology and religion or cross country projects in any subject
- The chance to better support students with different needs e.g. by providing more individual regulation, support and possibilities for practicing, or by offering a broader spectrum of information for highly concerned individuals.
- With the new communication and collaboration functionalities of e-Learning, change the drill and practice detailed learning to more independent but guided knowledge acquisition.

However, the amount of e-Learning in the sense of electronic learning that seems to be useful differs much between primary and post-secondary education, because primary education also has the additional goal of socializing children which cannot be done yet by e-learning in a sensible way. Therefore, in this case, it is more a supplementary way of learning and teaching and not a replacement.

- Working life (corporate training sector): Here, e-Learning has its chief advantage in its elimination of the boundary between learning and working. However, it does not signify that learning can be done completely on the side, because learning is an intellectual process that still needs its time and environment. It means that learning can be better incorporated in the working process (Roblyer, 2003). Examples for this are:
    - Just in time knowledge: Learn what and when you need it. This requires that the learning system is accessible at any time with ease to use to focus on the knowledge and problem solution and not on the system.

- Assured rapid knowledge transfer: Inform employees about things they do not even know exist in a supervised way so that it is verifiable that the information has been consumed and understood.
- Quick distribution of information about new products and strategies which have a short life span to a large number of employees. Conventional learning strategies are not able to perform a "rollout" to several hundred or thousand employees within short time.
- Human Capital Management (HCM): This is a more focused and strategic training of employees depending on their future employment and career path. The training can be perceived with blended learning (integrating different learning strategies, e.g. ILT and e-Learning), but coordinated and controlled by skill gap analysis and skill management (as part of an overall e-Learning architecture).
- Virtual corporate universities: Especially in large enterprises with many employees it makes sense to have one centralized trainings department, the so called corporate university. However, quite often large universities have many branches which are distributed over several countries or even continents. In this matter, it is more efficient to make large parts of the training virtual to cut down travelling costs and absence of the workplace and offer distant education within a virtual university.

- Life-long learning: Short production cycles, the short half-life period of knowledge and new ideas continue to revolutionize our day-to-day life. As an employee or as an individual, "What you know" equates to "What You Are Worth". Workers buy Skills and Know How. Keeping up in times of rapid change increases the individual's worth and is the pre-requisite for career advancements. Even in our daily life, new tools and concepts have an impact and require ongoing learning. E-Learning could be an excellent and cost efficient solution which allows learning at home.

3.5 Critical Analysis of advantages and disadvantages of E-Learning

Several benefits and limitations are usually associated with e-Learning. Below are listed some of the examined advantages along with their potential risks and checked under which pre-requisites they can be true and take a look at disadvantages and show possible solutions for them.

Advantages

(a) Independence of learning place

Advantage:

Individuals at different places can effectively communicate with co-students or instructors without being in the same room. Students can learn at home in a relaxed atmosphere or at their working places.

The biggest advantage here is cost and time saving, because neither travel and accommodation expenses arise, nor do costs arise for missed functioning time due to travelling.

Potential risks:

The most important requirement for e-Learning is access to the system over the Internet or Intranet where the learning environment runs. However, not always are the bandwidth and thus the connection speed sufficient for the e-Learning content, especially if it is multi-medial. In addition to that, excellent Internet access can become quite cost intensive. However, flat rate xDSL (digital subscriber line) or cable-modem connections begin to widespread especially in cities and will soon become a standard in a high percentage of households. In the meantime, a combination of offline and online learning, where the user need not be online all the time but just to synchronize with the server could be a solution for that problem.

But that is just the beginning. True spatial independence will emerge when handheld devices or lightweight laptops in combination with wireless connections (over e.g. ISO802.11b (IEEE 802.11b) or UMTS are fully developed and gain acceptance.

Independently of all technical aspects, we also have to take a look at social impacts of learning at external training institutions: meeting other learners at

different places often in different cities far away from daily dealings can also be of special value and often understood as an additional incentive, maybe also because learners know that this is rather expensive. In addition to that, it might be rather sensible to not hold an e-learning course as a completely online course but also schedule real face to face meetings. (Blended learning)

- at the beginning of the course, to introduce all learners and the teachers to each other,
- maybe during the training to implement communication and collaboration, provide synchronization points and inspire the learners and
- at the completion of the course to discuss how to advance after the course, because with e-learning, learning is not necessarily over with the end of the course but could be re-done or extended.

(b) Free choice of learning time and speed and Just-In-Time learning

Advantage:

Learners can decide when the best time for learning is, e.g. during breaks or when the learner is comfortable and can adjust the speed of learning according to their needs like their powers of comprehension or whether they are in a healthy state.

Just-in-time learning allows individuals to learn on an as-needed basis. Learners or students can access information quickly at the time the knowledge is needed rather than obtaining information that may never be used or may be used in the long-term.

Potential risks:

Two important parts of e-Learning are collaboration and communication. Especially synchronous communication like chat or video conferencing is highly time dependent and only works when all communication associates are online at the same time and thus requires good time management. Even asynchronous communication and collaboration are not completely free of time constraints because it does not make sense to answer questions or work together on a project if the time delays after each response are weeks or months. Even days can become a trouble when close collaboration is required.

However, from a pedagogical point of view, taking an e-Learning course can not be done during working breaks. Given milestones that have to be reached, virtual meetings or virtual office hours with a fixed place within the learner's time schedule can assist to put a convinced pressure on the student to advance with the self-learning or fulfil the given tasks and exercises.

(c) Fast distribution and dissemination of new information to many people

Advantage:

E-Learning increases the pace at which knowledge is acquired, which is especially important in the research and development process and can be used to distribute information about e.g.

- New developments and strategies that have a short life cycle to train researchers and scientists or consultants or
- Technical changes which have to be implemented by a large number of employees as quickly as possible

Potential risks:

The establishment of the e-learning environment and especially the production of content material are not rapid and efficient enough. Reuse of content units, metadata and standardized interface can help here. Quite often less classy content can be enhanced by a good learning strategy and good support by the instructor or tutor.

E-learning is not only a technology that has to be introduced but a whole concept which also require changes in the organization to work effectively and efficiently, especially in combination with secure information delivery and just-in-time learning, there is no clear dividing line between intranet/knowledge management systems and an e-learning environment. To make it work successfully, an overall model needs to be made and pushed through.

(d) Adaptive learning

Advantage:

With e-learning, the learning content and theory can be adapted to each individual's strengths and weaknesses to make the learning experience most efficient. Depending on the awareness and knowledge background of the

learner, which has been determined by pre-tests, the ideal learning style and type and the progress made so far (verified by post-tests and the speed of learning) the environment decides what and in which way content should be offered next. Possible potential parameters are different learning paths through the content, different ways of presentation of the same content (e.g. through audio) or offering a diverse set of functions which the user interface of the learning system provides to reduce complexity.

Potential risks:

Unfortunately, Intelligent Tutoring Systems (ITS), which are by concept the most advanced form of adaptive systems, are quite complex and not fully developed yet. Most e-learning systems only provide restricted feature set (like pre/post-tests and simple learning paths) and the creation of contents which support these techniques is rather expensive and time consuming. Here, excellent authoring tools and reuse of content could help a lot.

Quite often the learning subject matter which does not only consist of the content is not well organized and does not support different learning concepts and techniques or the learner does not know how to deal with or use them because the user interface and management of the system, the instructor and the content is not good enough (Moore, 1993). The only solution to this problem is that course authors, instructors and developers of e-learning environments are aware of pedagogical principles and act accordingly to get the most out of the technical possibilities.

(e) Multimedia and interactive learning motivates and ensures learning success

Advantage:

Numerous research efforts on the effect of media on education have shown that different media types have different efficiencies in terms of what a learner can recall.

In general from 100 % of the learning material (facts/ideas) we can remember:

- 10 % through reading,
- 20 % through hearing,

- 30 % through seeing,
- 40 % through hearing and seeing,
- 80 % through hearing, seeing and doing (interacting)

In addition to that, well organized content is fun learning and thus motivates the learner which increases learning accomplishment.

Potential risks:

Unfortunately, the creation of high-quality content, especially when it contains multimedia (animations and simulations), audio and video parts is very costly and requires good know how in different knowledge areas. In addition to that, available bandwidth and connection speed still restricts the use of large volume of data such as videos.

A way around these problems are better authoring tools which mechanize large parts of the authoring process (including technical and pedagogical issues), reuse of content and the use of other learning units that do not only focus on fully prepared content, but make collaboration, communication, self-controlled knowledge gathering and content production a key element.

Other possibilities to work around the technical limitations of limited bandwidth is using the already previously mentioned hybrid technology which combines online and offline learning, where large volumes of data (such as videos) are accessible locally.

(f) Supervision of learning process and tracking of learner's performance

Advantage:

Server based e-learning environments offer the possibility to log any transaction to the server and thus provide a detailed report how the users perform within the environment. This information can be used to get a general idea what progress the learners make and act accordingly by motivating them or offering help in case of difficulties and technical hitches. It can also be used to find out who is good at doing certain things at an early phase and support the learner by offering a special career path.

In addition to that, the system can be also used to manage proficiency profiles of all tracked learners at a higher level to find out who is an expert for a special knowledge area or what information is missing to make him an expert.

Potential risks:

The above described advantages are mainly on the instructor's side; the learner might perceive such things a little bit different because this kind of controlling can also be understood as a contravention of privacy. Depending on the country, different laws which protect people's personal sphere could exist. In addition to consider local laws and learners' objections, special care has to be taken that this kind of information must not be misused.

Disadvantages

(a) No personal contact to teacher/coach and to other learners

Disadvantage:

Virtual communication such as audio and video conferencing is very costly and is not always possible and also not a full replacement of face to face contact. There is a lack of personal contact which de-motivates learners and increases the drop out rate.

Remedy:

To keep online learners motivated, several measures can help:

- Community building: By creating a team of learners working for the identical goals and supporting each other, an internal pressure for development and success is put on all members.
- Attainable goals and milestones help the learners to check whether they are on track or need to speed up.
- Clear and lucid guidelines and a good user interface prevent users in getting lost within the system and give up. User needs to feel at home within the environment.
- In case of very difficult topics: Cover the primary learning goal into a different more appealing story which is easier to understand and makes more fun. This uses the supplementary learning effect (Holzinger & Maurer, 1999).

- Blend online learning with real face to face interactions to introduce all members and synchronize their learning progress.

(b) Incentive of external training does not exist anymore

Disadvantage:

External trainings, especially longer training periods are often seen as an incentive because they are very expensive, travelling to other places and cities and coming in contact with other people and cultures, social events are fun.

Remedy:

Make it clear that participating in trainings is the real incentive and a special chance at the same time. Provide other incentives directly associated to success of training to ensure that it has an immediate effect e.g. opting and finishing several trainings lead to a healthier position or a progression on own career path.

(c) Difficulty in learning from a computer display:

Disadvantage:

Compared to books, reading from monitor or screen is more strain on the eyes.

Remedy:

One of the possibilities is to use other media than the screen, e.g. audio that explain certain aspects, or incorporate tasks which do not require the computer display to look at, not everything require a PC to be done or practiced.

For the future, there is a hope that display technology will improve significantly. High-quality TFT displays are already available and will continue to increase in optimum brightness and contrast, new technologies like electronic ink (E-Ink) (Jacobson, 1997) are currently under development.

(d) Only few online-learners finish a course

Disadvantage:

According to Forrester research, 70% of learners starting with an online course will never finish it. Carr (2000) noted that dropout rates are often 10 to 20 percent higher in distance education courses than in traditional courses. Is online education really efficient enough?

Remedy:

For some dropouts, there are a number of well-documented reasons, including the fact that adults sometimes only register for a course in order to obtain knowledge or a degree, not credit, and may therefore drop the course once they obtain it. Motivating learners to keep them working with the learning environment and topic is the key to successful learning. To achieve this division, use of different pedagogical concepts is required. One key concern here is the support of learning communities.

According to Rovai (2002a), seven factors which positively correlate to sense of community and influence course design and pedagogy are:

- Transactional distance: This is the psychological and communication space between learners and instructors and is a function of structure and dialogue. Structure is the amount of control exercised by the instructor in a learning environment and tends to increase psychological distance. Dialogue is the amount of control exercised by the learner and tends to decrease psychological distance and increase sense of community.
- Social presence: This means that tutors need to be present within the virtual community; creating content and establishing the community without fostering it is not enough.
- Social equality: One of the difficult tasks of a tutor is to play the role of a moderator to insure equal opportunities for participation by all students. A threat to community occurs when one or more students use an authoritative tone in online discussions, followed by those students who have a more inclusive style of discourse, who feel put off and thus reduce discussion participation.
- Small group activities: Breaking large numbers of students into small groups (typically under ten learners each), providing specific tasks, and setting timelines support the concepts of situated learning and communities of practice and help students make connections with each other.

- Group facilitation: To support the group's way of working, to strengthen, regulate and perpetuate the group as a group the following skills are useful for the tutor to have as the group's facilitator: encourager, harmonizer, compromiser, gatekeeper, standard setter, observer, and follower.
- Teaching style and learning stage: Good teaching does two things:
  (a) it matches the student's stage of self-direction, and
  (b) it empowers the student to progress toward greater self-direction.

Good teaching is situational and requires that the online instructor design and facilitate an online course that accommodates the needs of all learners, regardless of their stage of learning.

- Community size: The right community size is the last important factor to correlate to the sense of community. Too few members generate little interactions and too many members generate a sense of being overwhelmed. As a general guideline eight to ten students are the critical mass necessary for a community where 20-30 students are the maximum that a single online tutor usually can handle. However, larger online courses can be managed by using a team teaching approach in order to maintain a reasonable student-instructor ratio and by using multiple active discussion groups so that each learner can make connections with a reasonable number of community members. Alternatively, large courses that focus on delivering content can be created, followed by small discussion groups led by subject matter experts providing one-on-few coaching and mentoring (Rovai, 2002b).

(e) Time consuming, complex and expensive installation of learning systems

Disadvantage:

Here we have to distinguish between the installation of the system and its usage. The installation is indeed a complex task which must not be reduced to the technical parts like setting up the system and its technical infrastructure but also have to include the organizational concept which is required to make e-learning a success. Unfortunately, the usage of the system for the different

types of users is quite often too unclear and confusing and leads to improper and inefficient utilization.

Remedy:

Designers and developers of e-Learning environments have to place more stress on usability, consistency and modularity, keep it simple and intuitive ("less is more"). Users should enjoy using the system, which also includes that such systems have no or very few bugs. The advantages of the system must be clearly visible for all involved roles (learner, trainer, author, administrator and the decision makers who pay for all of this). Immediate Return of Investment is probably more important here than elsewhere to be successful.

(f) The creation of e-learning courses is too expensive

Disadvantage:

The production of high quality e-Learning courses is very expensive.

Remedy:

First this is not completely true because that depends on how the course is used and which costs are compared. If an expensive course is used by hundreds or thousands of employees that otherwise would have been trained by traditional instructor led training seminars and if all additional costs such as travel and accommodation costs and absence times are included in the comparison then the creation of an expensive course and giving the online seminar might be still the cheaper solution.

In addition to that authoring costs can be reduced by good authoring tools and reuse of already produced material. Another possibility to cut down costs for creating course content material is to reduce the amount of material used and substitute it by other learning concepts such as online collaboration.

3.6 International Perspective of E-Learning

The universe of post secondary education is ever expanding and demanding. The present age is an era of rapid demographic and labour market changes, increased competition, shifts in institutional form (e.g., non-profit/for-profit partnerships, corporate universities) and new forms of delivery driven by emerging technologies. Online education is constantly challenging the

traditional importance of institutional locale and political boundaries. It has run into the considerable complexities and policy collision of state and national regulation and multiple levels of accreditation in European countries. On the international level, significant attention is being paid by UNESCO, OECD, and others to the role of e-learning in cross-border education and its implications for national quality assurance and accreditation.

In February 2006, the Center for Studies in Higher Education (CSHE) at the University of California (UC), Berkeley, with the support of the Ford Foundation and the Andrew W. Mellon Foundation, convened 21 experts at WCET in Boulder, Colorado, to explore and inform current and ongoing debates in the regulation of technology-mediated higher education both domestically and globally (Dow, Lohnes & Albertson, 2005).

In the United States, there were more than 500,000 enrollments in online courses in grades K-12 and more than one-third of public school districts offered some type of eLearning during the 2005-2006 school years. The North American Council for Online Learning (NACOL) surveyed over 30 countries in order to highlight international trends in online learning, identify online learning initiatives and projects in individual countries, and to promote international dialogue for future collaboration.

New South Wales Australia provides online learning to K-12 students through the Country Areas Program (CAP). The program services 248 public and private schools as a component of the Commonwealth's Programmes. CAP's focus is to improve the education of students living in remote and isolated communities. Seven consultants assist schools across the state in implementing programs, activities and workshops on online learning.

Education in Canada is a provincial government responsibility. The Ministry of Education (provincial) and Districts (local) at each level monitor and implement e-Learning programs. All provinces have made progress with regards to online learning, but a national plan has not been developed. There have been discussions around the collaboration of consortiums across borders.

Due to high costs and the current state of the Internet, e-Learning in China is still new and only used as a supplement to the current face-to-face content. The number of online learners is growing, but the increasing number of e-Learners still accounts for a very small percentage of China's population. Specialists have forecasted that the excitement of online education will push the current, non-ideal Internet in China to make profits through e-Learning.

E-Learning in Hong Kong enables students to engage in collaboration, inquiry and projects at anytime, from anywhere. It was stipulated in the new IT in Education Strategy Policy Document "Empowering Learning and Teaching with Information Technology" published by the Education and Manpower Bureau (EMB) in July 2004, that suitably designed e-Learning platforms to support the above-mentioned learning activities, which will be provided for all primary and secondary schools. All public sector schools in Hong Kong are funded by the Government. Currently, there are no schools which provide entire online courses for students to complete all of their studies from home. Instead, local teachers create additional learning activities for students to work on online after school or at home as a means to strengthen the classroom teaching which occurs during regular school hours.

Online education in Iran is delivered by both the private sector and government organizations. Students from the urban areas and large schools are participating in online courses. E-Learning in Iran is based entirely on a blended model of learning. Courses are developed by the government and are free of charge for the student. The government has been working to create education standards, but they have not yet been published. There are currently no entirely online courses in the country. Several teachers in Iran are also collaborating with other teachers from all over the world in online projects sponsored by iEARN and ENO. At the university level, Iran is working with Italy, Germany, and the United Kingdom to develop online courses.

Singapore schools have the autonomy to decide how they want to implement the use of IT for teaching and learning, which includes online education. At this point in time, about 75% of the schools have subscribed to learning

management systems (LMS), and the percentage is rising as the remaining schools plan to come on board. A few have also developed their own system using the open source software, Moodle. The country's goal is to have all secondary schools (grades 7-10) and junior colleges (grades 11-12) using an LMS by the end 2006. "iSHARE" (Inter-Cluster Sharing of Resources) is a content management framework which allows schools working within a cluster to share digital content with one another. This intranet framework facilitates the sharing of digital teaching and learning resources among schools in order to support online learning in the schools.

E-Learning began in Turkey in 1995 by the Turkish Education Foundation, which was created by prominent businessmen and women in the country. The local governments started with 40 rooms, Learning Stations, in the most remote areas of Turkey, where teachers cannot be sent because of terrorism. A few years later, these rooms were set up with computers, compact discs, and the Internet. Today, there are over 100 stations set up, which service over 600,000 children and adults.

E-Learning in the United Kingdom is relatively widespread in the university sector but is much less common in the K-12 school sector. The government, institutions, and faculty members are working together to develop content in the universities. In May 2005, the Department for Education and Skills created the e-strategy: '*Harnessing Technology: Transforming Learning and Children's Services*' to provide a master plan for the future of e-Learning in the U.K. Their goal is to build a common ground by bringing the education and children's services groups to a level of using technology effectively within the next five years. Within ten years, they want to build on the capabilities of their newly skilled workforce in order to become more ambitious and innovative.

Models for funding e-Learning, the process for content creation, and professional development for teachers have been successfully implemented in those countries who have implemented online lessons and courses. However, the need for standards and measuring quality in online content is lacking in most countries. Australia, Canada, and Singapore have taken the lead in the

development of these standards and measures of quality for their individual countries, and New Zealand is currently working with the IMS Global Learning Consortium to adopt international standards that can be used by countries around the world. SCORM standards have been implemented internationally; however, not all e-Learning programs are in compliance. This summary provides several exciting and promising approaches and trends for the future of e-learning.

3.7 E-Learning in India

E-learning, though reached India late of course, but it is being fast accepted in a big way. India perhaps has watched the success of west in adopting e-learning and is trying hard to implement it. Over the past few years, the Ministry of Human Resource Development has been trying to achieve the target of making education accessible to every corner of the country. Still there are many parts of the country, which are in darkness about e-learning (Malik, 2009). Due to the growing Indian economy, India has a chance to become heart of e-learning programs. There are many e-learning classes which are coming to India to build and develop e-learning infrastructure. E-learning does not seem to replace the conventional classrooms with black boards but it seems to coexist with the already existing system. This system rather promises to reach far off rural areas in India where education is still a looming darkness. This objective can be achieved by providing PCs at low cost with broadband connection. The chances of e-learning to strengthen the educational system in India are very high. Furthermore the Government has also come forward undertaking the programs of upgrading the technical quality of the fresh graduates inciting them to go into research and teaching professions.

E-learning is fast growing and seems to take control of the world because of its advantages (Saha, 2010). The scope of e-learning is much wider in India with many e-learning companies stepping forward in providing the service. Though nothing can actually outrun the popularity of traditional classroom teaching, e-learning only gives more value to the process, independent of the distance factor. In India, e-learning scenario is still growing and at an experimental

stage. Traditional mindsets are changing, with the corporate and business sector leading the way in embracing technology-based learning avenues. Many institutions have started augmenting teacher-led programmes with content-rich e-learning modules. Government initiatives are not far behind either. The projection for further development of distance e-Learning in India is positive. Several efforts are currently progressing towards providing quality distance learning to more people in urban and rural areas, through the utilization of more effective web resources and practices. The major hindrance to the acceptance of e-learning can be attributed to the Indian mindset that is more inclined to traditional classroom teaching (Hansen, 2008). With PC penetration and overall online accessibility increasing in the country, the future of e-learning looks promising provided the organization of content and delivery is well-structured.

3.8 E-learning initiatives in India

Some of the Indian initiatives taken by the Indian institutions towards e-learning are given below:

NME-ICT:

In February 2009, India launched a National Mission on Education through ICT, which is a Billion Dollar enterprise. It will provide internet connection to about 20 thousand colleges and other educational institutions. UNESCO is intended to play a significant role as a global clearing house of ideas and to foster the growth of knowledge based societies. They wish to offer sharing the e-learning materials prepared by India under this national mission by 3 the Indian Institutes of Technologies (IITs) so that all those around who wish to access quality knowledge can do so freely (Asvina, 2009).

E-Gyankosh:

A National Digital Repository of learning resources, project was started by Indira Gandhi National Open University in 2006. The repository was developed using Dspace open source software, which ideates to store, index, preserve, distribute and share the digital learning resources of open and distance learning (ODL) institutions of the country. A support to a large

aggregation and integration of learning resources in different formats such as self-instructional study materials, audio-video programmes, and archives of radio and television-based live interactive sessions is supported by it.

NODLINET:

The Library and Documentation Division of IGNOU has started making efforts to take higher education to the doorsteps of the hitherto un-reached through its diverse modes of Information and Document Delivery Services. NODLINET (National Open and Distance Learners' Library and Information Network) is one such recent initiative taken up by IGNOU to provide a podium for libraries and information centres of the open and distance learning system of the country that will provide access to all electronic and digital resources from the leading publishers and vendors across the globe to its stockholders from anywhere at any time using sophisticated technologies to enhance the quality of education at par with the conventional education system (Arora, 2007).

Inter University Consortium:

Inter University Consortium for Technology-Enabled Flexible Education and Development (IUC-TEFED) is the latest initiative of IGNOU which works as a nodal point to undertake all types of collaborative activities involving Open and Distance Learning, new knowledge creation, e-learning, appropriate technology, etc. The structure of Inter University Consortium is on the lines of Pan-African e-Network and the existing consortia of UGC, AIU, etc. All the open universities in the country can be its founding members while conventional universities as its associate members. NGOs and organizations involved in the development of Education and Training, Industry, etc can also be invited for alliance and partnership. The consortium is expected to facilitate convergence and sharing of knowledge through judicious mix of media and technology (IGNOU IUC Report, 2008).

UGC-CEC:

UGC had established a consortium for educational communication (CEC) in 1993 which is an inter-university centre for electronic media with the following laid down objectives:

- Close coordination, facilitation, overall guidance and direction to the activities of the Media Centers set up by the UGC in various universities.
- Dissemination of educational programmes, through both the broadcast and non-broadcast modes.
- Production of educational programmes (especially video and audio) and related support material and setting up of appropriate facilities for this.
- Research related to optimizing the effectiveness of the programmes.
- Providing a forum for the active involvement of academic and other scholars in the creation of appropriate educational programme.
- Studying, promoting and experimenting with new techniques/technology that will increase the reach and/or effectiveness of educational communication.

An initiative was launched by CEC known as Learning Object Repository (LOR) which is an Open Courseware initiative having educational resources in different subjects like Archeology, Biology, Botany, Chemistry, Commerce, Computer Science, Economics, Education, English, Fine Arts, etc. Users have the facility to browse the LOR by using various options such as Topic, Subject, Learning Object, Keywords, etc. The system has grown to 17 Educational Media Research Centres and Audio Visual Research Centre, now known as EMMRC.

Gyan Darshan:

The number of educational programmes has increased to 1000 programmes per year from 25 in the beginning. CEC runs a 24hr higher education channel known as Vyas Channel on Gyan Darshan Bouquet which is now also available on DTH. National channel also telecasts these programmes for 1/2 hour daily. The first mission of this channel is to find out knowledge need of the people through research and address the same by developing "knowledge resources" with the help and support of research facilities available in the universities and colleges of the country. The second mission is to bridge this gap making quality knowledge packages delivered by the best teacher available to those

who desire to get benefit from it. The third mission of the channel is to make knowledge free and seamlessly available to all those who need it.

CEC is also having a Media Tape Library with a total collection of about 16000 Educational Video Programmes on betacam cassettes consisting of the categories of collections mentioned below and is available both in English and Hindi and adds about 1000 Video Programmes on various subjects and topics to its collection every year from the Multimedia Research Centers spread throughout the country (CEC-UGC).

NCERT Online:

Yet in an another initiative by government of India, a project undertaken by the apex organization NCERT in the form of NCERT online textbooks showed that e-learning can reach to maximum. NCERT publishes school textbooks and it has initiated a step towards making school textbooks freely available on the internet for students and teachers through its website. This portal provides easy navigation to textbook chapters by title/subject of the book for a particular class. The textbooks available there are written in English, Hindi and a few in Urdu (Sarma, Majumder & Jyoti, 2009).

UNESCO SALIS:

An e-Learning Portal for Awareness Raising on Information Literacy was launched by the Indian Society for the Advancement of Library and Information Science (SALIS), in collaboration with UNESCO in 2006. This project has its genesis in recommendations of a UNESCO supported Workshop on Information Literacy Competency Development for Information Professionals and Special Educators organized in November 2006 by SALIS in Chennai, India, and subsequent Information Literacy sensitization workshops held in Delhi and Nagpur in December 2006. The e-learning portal will cover a number of self-learning modules, such as:

1) Information communication technology (ICT).
2) Information literacy.
3) Information literacy models and standards.
4) Lifelong learning and development of life skills.

5) Information literacy assessment.
6) Information services for disabled people.
7) Freedom of information/Right to information.
8) Sample Information Literacy Programmes for
    a) School library.
    b) College/University library.
    c) Special library.
    d) Public library.
    e) Communication information centers.

The Portal aims to raise awareness, sensitize and enhance information literacy competency skills of common information users as well as information professionals and educators in the South Asian sub-region. Its objectives are fully in line with UNESCO's mandate to bridge the digital divide and UNESCO's vision of knowledge societies. The portal will be developed using Moodle Open Source software, an internationally renowned Courseware Management System (CMS) or (VLE) Virtual Learning Environment (UNESCO).

e-Gurukul:

Another collaborative project of Documentation Research and Training Centre (DRTC), Bangalore and Goethe-Institut in New Delhi in 2007 came in the form of Indo-German eGurukul on digital libraries to facilitate self-paced learning on digital libraries. Presently this e-learning portal has various modules covering different aspects of digital libraries and has been designed using Moodle open source software. The Indian digital library experts, in collaboration with their German counterparts, have developed the content of these modules.

Eklaviya:

Another illustrative open education initiative is Ekalavya, launched by Indian Institute of Technology, Bombay in 2004. In this project, content developed in various Indian languages is distributed over the Internet. The Ekalavya project has developed an Open Source Educational Resources Animation Repository

(OSCAR) that provides web-based interactive animations for teaching. OSCAR provides a platform for student developers to create animations based on ideas and guidance from instructors. Funding for the Ekalavya and OSCAR project comes mainly from private industry. The ekalavya portal is an attempt to generate an interactive platform for the creation, absorption, dissemination and usage of knowledge for the well being of the individual and the society. It is a significant step forward to bring together students, teachers, and working professionals to meaningfully enhance the productivity of the group and spread knowledge.

The Ekalavya portal aims at a free exchange of knowledge and ideas, by placing all the relevant academic material in the Open Source, thus making considerable contribution to society. It is envisaged that the ekalavya project will become an all-encompassing activity over the years, using IT effectively for education. It aspires to build large collaborative communities where seekers are matched by the givers. Its eOUTREACH programme creates high quality digital text, audio, video and HTML contents of educational value for knowledge dissemination. This initiative of the Project ekalavya has been funded and supported by the Technology Information, Forecasting & Assessment Council (Ekalavya, 2004).

Tamil Nadu IT Policy:

The Tamil Nadu government announced an IT policy as early as 1997 to put smile to prosperity on the face of every citizen of Tamil Nadu by leveraging Information Technology (IT) to create value and wealth for a knowledge-based society. Objectives for their IT policy are listed as under:

- To establish Tamil Nadu as the destination of choice for IT investments.
- To upgrade the quality of life for the citizens through e-governance and IT applications in government.
- To empower people in rural areas so as to bridge the digital divide.
- To develop Research and Development initiatives.
- To promote use of Tamil in Information Technology.

It has also laid emphasis on IT services being provided in local languages. State government has also organized an international conference on the standardization of Tamil code and keyboard. The government has already given rights to three companies to establish broadband network infrastructure. Tamil Nadu's vision is to consolidate its leadership position and firmly establish its preeminent position in IT. The large base of engineering institutions in the state is a significant asset. They will be encouraged to interact with industry, centres of excellence so as to have the best match of Industry-Academia. Sufficient mechanism will be created to implement cyber laws. Software piracy, IPR issues and violation of cyber laws will be curbed. In short, the policy will make Tamil Nadu as the 'Destination of Choice' for IT investments globally (Elcot, 2002).

UGC INFONET:

In 2002, deliberations of various committees were held that led to the setting up of the UGC-INFONET towards the end of 2004. UGC also joined this crusade of introducing e-learning. Wholly funded by UGC, UGC-INFONET provides electronic access to scholarly literature available over the Internet in all areas of learning to the university sector in India. UGC plans to link all Indian universities and Research and development institutes together with a strong intranet network, which will ensure smooth and quick dissemination of information and will be a big step towards Educational Development in the country (UGC).

IGNOU Flexilearn:

In 2011, IGNOU launched an online learning portal known as Flexi-learn, which offers free of cost learning by providing free access to IGNOU's courses. It integrates free learning resources with learning management systems for anyone who wants to learn, whatever their educational needs and experience may be. It has got unique features whereby students find an open and flexible environment to learn and choose their guides as mentors. The personal learning environment also has interactive tools like discussion boards, blogs, wikis, podcasting, RSS feeds etc.

IGNOU LIVE:

In the same year 2011, IGNOU launched another virtual platform for library and information science. For imparting online education, Library and Information Virtual Education (LIVE) in-house content management system was developed. MLIS programme has been launched wherein information access, processing, organization and dissemination are the core components. It is a complete virtual learning environment suite covering all activities from registration to certification with a 24x7 learner support.

Uttar Pradesh IT Policy:

The Uttar Pradesh government planned to achieve 100 per cent IT literacy among government employees by 2002. It decided to introduce computer education in 100 Intermediate schools. As for IT infrastructure, 70 out of 83 districts have optical fibre connectivity. In the hill districts, VSATs will be used in the future.

Satellite E-learning Network:

In July, 2005, the agreement signed between the US and India, six leading American Universities representing the US, ISRO (Indian Space Research Organization) and DST (Department of Science and Technology) along with Amrita Vishwa Vidyapeetham representing India, will participate in a project designed to enhance higher education and research in India through a satellite e-learning network. The beneficiary institutions are IITs, NITs IIIT, BIT Ranchi, and a few other prestigious Institutions across the country.

NPTEL:

Yet another project to provide web based training is the National Programme on Technology Enhanced Learning (NPTEL), which is being funded by the Ministry of Human Resource Development (MHRD.) This was first conceived in 1999, to pave the way for introducing multimedia and web technology to enhance learning of basic science and engineering concepts, was launched in September 2006. Six major engineering disciplines have been covered in this project so far at the undergraduate (B.E./B.Tech) level. The educational goals set by the Ministry of Human Resource Development are:

- To make video lectures in a format appropriate for broadcasting that would provide quality content through the Technology channel named the Eklavya channel by the previous Honorable Minister for Human Resource Development in recognition of the first student of distance education named in the great Indian epic Mahabharata thousands of years ago.

• To create web-based (e-learning) material and make it available in the form of a portal / DVDs that would be tailored to meet the needs of engineering students across the country.

• To create a website for NPTEL activity.

• To make e-learning material available in the web for the video lectures to supplement class room teaching.

• To advise target institutions with regard to the software/hardware requirements for benefiting from the national project.

NPTEL has developed curriculum based video courses (110 new courses and 109 existing courses encapsulated in digital video format) and web-based e-courses (129). This has been undertaken by IITs (Seven) and IISc Bangalore as Partner Institutions (PI) and other selected premier institutions as Associate Partner Institutions (API) through a collaborative effort.

In addition to this, a number of core curriculum courses common to all engineering programmes such as mathematics, physics, chemistry, management, electronics, language etc. have also been included. The broad aim of the project NPTEL is to facilitate the competitiveness of Indian industry in the global markets through improving the quality and reach of engineering education. The operational objective of NPTEL is to make high quality learning material available to students of engineering institutions across the country by exploiting the advances in information and communication technology. The target group for this project consists of students and faculty of institutions offering undergraduate engineering programmes in India. A formal Memorandum of Understanding (MoU) between five IITs, four IIMs and CMU established a Virtual Centre for Technology Enhanced Learning (VCTEL). It

was the first initiative in which all IITs and IIMs shared a common vision and proposed to work together to improve the quality of science, engineering and management education all across the country by offering courses through VCTEL. This proposal was submitted to MHRD in 1999 and revised several times (EGP-AICTE-NPTEL, 2006).

UGC Networking:

In a small town called Lohari in Maharashtra, a student of a technical college told the UGC Chairman that he was not worried if his Professor taught him or not as they downloaded materials from the Internet. This incident reflected the UGC's thinking in reaching out to rural areas. Each university will be encouraged to establish a local area network (LAN) to enable connectivity within the campus and to establish a larger network for connecting all colleges under its jurisdiction. The sites will serve three main purposes: enabling universities to share library resources and research journals, providing teachers and students with access to information available on the internet and other multimedia educational material; and helping teachers develop their own multimedia courseware. The UGC plans to invest Rs 150 crore over the next 5 years in this.

Shiksha:

The recent visit of Microsoft Chairman Mr. Bill Gates to India focused, among many things, on bridging the digital divide and kick-starting e-learning initiatives in the country. After detailed discussions, Microsoft agreed to give $20 million for training the trainers in the e-learning programme, also known as "Shiksha". Under this, 80,000 teachers and 3.5 million students would be trained between a period of 3 and 5 years. The collaboration would be done in partnership with the Department of Information Technology (Nikam, Ganesh and Tamizhchelvan 2004).

24x7 learning (2009):

India's premier Talent Lifecycle Management Company announced that it is enabling Thapar University, Patiala, and Punjab - one of the oldest and established engineering institutions of India – to provide B.Tech courses

through e-Learning mode. Though B.Tech programs for diploma holder working professionals were available through Distance Learning in India, this is the first time that it is being offered online. The entire program will have around 300 hours of online classroom sessions to facilitate the learning process. Practical sessions will be conducted with the support of local engineering colleges in major cities across India or at Thapar University, Patiala.

Other State governments like Delhi, Gujarat, Assam, Uttar Pradesh, Arunachal Pradesh, Goa, Jammu & Kashmir, among others, are also in the process of spelling out their IT policies.

3.9 Need for E-learning in LIS-Education in India

E-learning should be adopted in LIS education for the following reasons:

(a) Management of Change

Like most other institutions libraries are also facing dramatic changes in its dimensions. Particularly, the growing use of ICT in library activities is enforcing many changes. However, the staff working for many years in libraries may not be well-convergent with the ICT. The reason could be the emergence of ICT long after them and their education. The ICT terms like metadata, thesaurus construction, ontology, taxonomy, electronic Dewey, information literacy programmes, open source software for library management, digital library, digital library software, creation and maintenance of institutional repositories, Web 2.0, Library 2.0 technologies and their use in libraries, HTML, XML, knowledge management, web design, copyright implications in the digital library era, etc. might be a bit difficult for them to comprehend. E-learning is the most suitable teaching-learning method for imparting education on such important and useful topics in LIS.

(b) Modular or Cafeteria-based Learning

Most of the undergraduate courses are of three years duration. The postgraduate courses are of two years duration. This 3+2 years pattern of education is common in LIS education also, and does not allow studying topics which are peripheral to the core subject of the degree. As a result, there remain some topics which the potential LIS professional desires to study, but not been

able to do so due to the set pattern. E-learning will certainly help to overcome this problem because it allows creating customised learning modules as per the need of the learner.

(c) Increased Expectations from the Employers as well as Users

All potential library employers expect that the LIS professionals must have optimum skills and thereby efficiency in their housekeeping operations. They also expect that the library staff should be able to provide library services effectively. The users of the library also have similar expectations. They feel that the library staff must answer their reference and referral queries quickly and accurately. One common expectation of both these stakeholders is that the LIS professional of any cadre must have skills to use ICT to provide efficient library services. Thus, the ICT handling skills have become an essential qualification for the LIS professionals. Due to time constraint, in-service library professionals may not be able to attend regular LIS courses. In such a situation, the e-learning remains the most viable option for in service LIS professionals.

(d) Multi-skilled Personnel

The present employment market expects that their potential employee must have multiple skills. The skills required by libraries are changing. A study indicates that library staff needs more and newer skills. The workflow is changing. The classroom-based, traditional pattern of LIS education may not allow the library staff to have multiple skills. Through e-learning they can acquire more skills at their own pace and time.

(e) Job-Specific Needs

The traditional LIS education, particularly in India, is a general LIS education in the sense that the learner of this system of education does not get specialised in managing a specific type of library. The learner does not get special/depth education for any specific information technology or on designing tools like ontology or a digital library. The above requirements are environment specific, where the LIS professional is working after having the basic LIS education through the traditional methods. E-learning offers the opportunity to provide

education, which is job specific and will help LIS professionals to perform to the optimum extent.

(f) Image of the Profession

The e-factor (electronic factor) is an image building factor. As such the provision of e-learning, if made available by the LIS educational institutions, will definitely improve the image of LIS teaching profession.

(g) More Content and Short Duration

In India library science is mostly taught as a postgraduate course (there are some undergraduate and certificate courses also). These courses are of one- and or two-year duration. New subjects, aspects, facets, are continuously emerging in LIS. The quantum of knowledge and skills to be imparted to the upcoming LIS professional are continuously increasing. It is difficult to provide all this knowledge and impart all expected skills in one or two academic duration. So the subjects which could not be taught/ studied during regular courses can be taught through e-learning.

(h) Changing Learning Trends

The changing learning trends are of part-time/home learner. To respond to these trends the LIS education should adopt the e-learning.

The scope of LIS education in India has undergone sea changes with the rapid expansion of research and development activities, particularly in the area of Information and Communication Technology (ICT). For qualitative improvement of LIS education in India, there is a need to introduce new courses based on ICTs in different LIS schools to face new challenges. In fact, technology has not only affected operations of library services but also LIS education itself. There is a need to integrate qualitative changes in LIS education to:

→ Increase excellence of LIS students to meet the growing demands in e-environment.

→ Face challenges due to the growing influence of ICT and its impact on LIS education.

→ Suit ever-increasing demands for trained LIS professionals.

→ Amplify career opportunities for LIS professionals.

→ Use internet-based e-learning courses which are growing day-by-day.

→ Adopt and promote e-publishing which is being fast accepted by the users.

→ Transform traditional and habitual mode of LIS education in India.

Appropriate utilization of technology for imparting LIS courses can produce better results. It has now become indispensable to consider the utilization of online learning environment in LIS education.

The main objectives as per Naik (2006) for providing LIS education in online environment must be:

→ To cover broad perspectives of the core principles of Library and Information Science and its applicability in the new milieu.

→ To understand the managerial activities of Library and Information systems in present context.

→ To comprehend the principles of knowledge organization, management, retrieval and delivery.

→ To develop practical skills in new online virtual environment to countenance the challenges.

→ To meet the demands of new digital era.

→ To educate learners in the tune of market demands.

→ To offer online information skills.

The education and training in LIS in the digital environment according to the study of Singh & Devi (2009) shall contribute to accomplish the following:

- Extensive theoretical and practical knowledge of information management and Business.
- Behavioural attitudes and understanding and information needs of individuals and institutions
- Financial and quantitative methods of analyzing organizational information
- Problem solving methodology

- Analytical abilities and critical thinking expertise
- Research theories and practices
- Human resource management and quantitative practices and management
- Competence in information handling
- Online information skills
- Expertise in the use of electronic information
- In depth understanding of information organization, marketing and using information retrieval systems
- Analytical abilities to access information and to understand the principles of the organization of knowledge
- Practical experience in information retrieval, indexing, cataloguing and classification of information resources
- Information management in various professional contexts.

The University Grants Commission (UGC) Model Curriculum Report, 2001 lists six levels of courses in Library and Information Science education in India, starting from Certificate course, Diploma, Bachelor (BLISc), P.G. Diploma (PGDIT, PGDA& PGDLAN), Masters (MLISc) to M.Phil and PhD. The courses are being taught by formal universities and deemed universities (both regular and distance stream), open universities, degree colleges, polytechnics, associations and even Government departments. After independence, various colleges, universities, educational institutions and learned societies were emerging and the need for professionally qualified personnel to manage their libraries was realized. As a result, the number of library science schools started to increase. Library associations which exist at various places started providing training courses (Singh, S.P. 2003).

After 1980, various open universities came up which offered courses in Library and Information Science in distance mode and today there are more than 20 Library and Information Science schools in India offering LIS courses through distance mode. Dr. B.R. Ambedkar Open University, Hyderabad (then known as Andhra Pradesh Open University) is the first Open University in India

offering Library and Information Science programs through correspondence at Bachelor's Degree and Masters Degree from 1985 and 1998 respectively, followed by the university of Madras, Indira Gandhi National Open University (in 1989) started BLISC and later MLISc and PhD programs. There are also some other open universities in India offering library science courses as Annamalai University, Algappa University, S.V. University Tirupati, University of Madras, Madurai-Kamaraj University, Madurai etc. The growth of distance education programmes in India has created an outbreak in the library profession as unwanted quantitative expansion affected the professional caliber and the quality of education being imparted (Naushad & Samar, 2006). But today, we are witnessing a global shift in the delivery of education brought about by the information and communication technologies known as e-learning.

Internet has emerged as a most important form of global communication and information exchange and it brought the online mode of education to the forefront. Through e-learning users may get any form of text, graphics, audio, video, animated graphics, and computer programs. It is the fusion of technology with education. "The major advantage is the consistency that e-learning provides. E-learning is self-paced, and learning is done at the learner's pace. The content can be repeated until the trainee understands it. It can be made compelling and interesting with multimedia, and the trainee can be given multiple learning paths depending on his or her needs," (Bandhuni, 2005).

In India, Ministry of Human Resource Development (MHRD), under its National Education Mission on Information and Communication Technology (NME-ICT) had assigned the job of content creation in various subject fields to UGC at post graduate level and a gateway has been developed known as ePathshala.

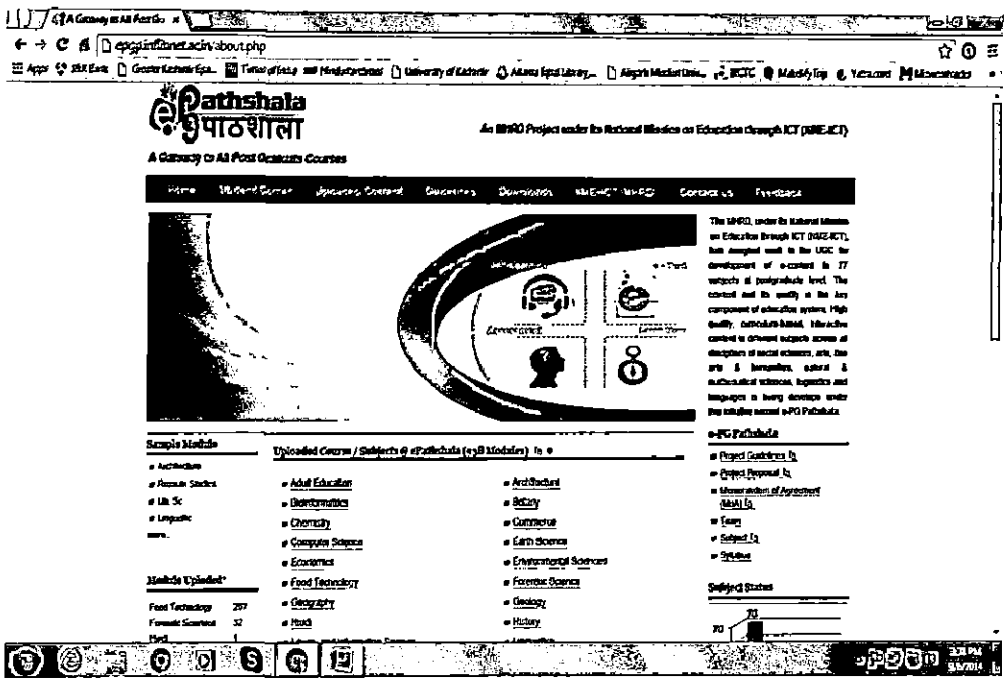


Figure- 4: e-PGPathshala Content Development Portal

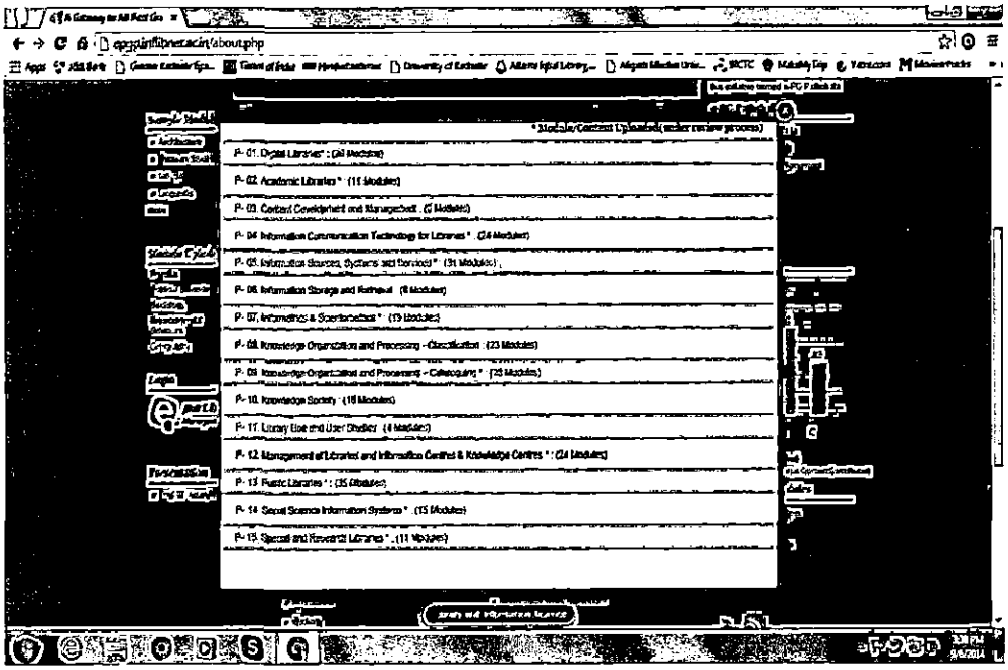


Figure- 5: Content Development in e-PGPathshala for LIS

Another e-learning portal has been designed for online learning and training known as Sakshat. It has been developed to facilitate lifelong learning for students, teachers and those in employments or in pursuit of knowledge free of cost.

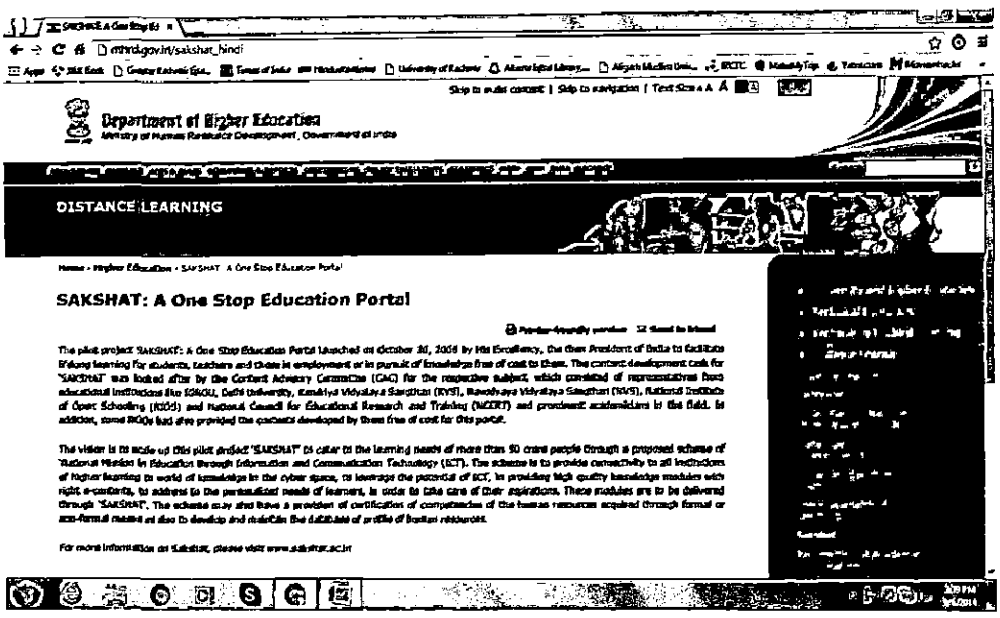


Figure- 6: Sakshat Education Portal (MHRD)

According to International Data Centre (IDC), the revenue earned worldwide from e-learning was 6 billion US $ in 2003. That was expected to rise to 21 billion US$ by 2008 and in the year 2011, it has grown beyond 60 billion US dollars. NASSCOM reports that Indian companies will get revenues of 7 to 9 million US$ by end-2005 and as per the latest report 2013, the Indian companies have earned the revenue of around 117 million US$ which was beyond the projected figures. It is evident from the above figures that the e-learning market in India is still in emerging stage but emphasis is being laid on perfecting the individual skills of learners because of which e-learning is becoming popular in India. In India, e-learning has been most successful in the corporate segment where it is seen as a means of achieving business goals and motivating employees. Many companies are involved in e-learning projects like Gurukul Online, Med Varsity, EduTech, Wipro, Tata Consultancy Services, Knowledge Pool, Brain Visa, Sify learning and are taking up new projects in collaboration with open and private universities for online learning.

3.10 Challenges to E-learning in LIS-Education

Some of the challenges that e-learning initiatives from the Institutions of Higher Education in LIS education could face are:

- For those Institutions offering online e-learning course, awarding a recognized degree for students might become imperative. Most students and the in service employers are happy only when a certifying endorsement is given.
- A fall out of the above could be escalating a number of online institutions offering courses with spurious certificates, which may not have any value.
- Since, the e-learning method is self-paced and self-learnt, the attention length of the student may not be enough for him/her to learn a concept.
- Generally the duration of the course also matters in this mode of lecture delivery.
- Lastly, the Legal implications of e-learning come into play. As e-learning over internet is across geographical boundaries, this makes it all the more, tougher for the enforcing authorities to have a global legal framework for the net offender.
- Measuring the level of success and the Return on Investment would be difficult.

(a) Cost

While delivery costs of e-learning are significantly reduced compared to costs associated with classroom learning delivery, especially when large numbers of learners are involved (Rumble, 2001), initial development and purchase of e-learning products represents a major barrier to the adoption of e-learning training within organizations. This claim is substantiated by evidence from a survey conducted for the Office of Learning Technologies (OLT) in Canada, which found that cost was the single most important factor preventing employers from investing in e-learning (Dugas, Green & Leckie, 1999). In any case, organization must weigh the initial costs of developing e-learning against savings accrued from economics of scale at delivery time.

(b) Lack of time

Lack of time as an obstructing factor comes second, after the cost barrier. Long development cycles prohibit many institutions from engaging in production of

custom e-learning training. Lengthy time-to-promote is especially true for small institutions who have limited capacities to produce complex, media-rich, highly interactive and customized solutions. As a result, an increasing number of institutions are starting to outsource their e-learning activities to an application service provider (W.R.Hambrecht et al., 2000c). The trend toward the Active Service Pages (ASP) model is still very slow mainly because institutions have proprietary content, highly confidential in nature, which they want to protect.

(c) Content Incompatibility and Penury

Locating appropriate off-the-shelf e-learning material or converting custom e-learning (i.e., classroom-based) material for use on an e-learning platform proves a major challenge for institutions. The difficulty resides primarily in the lack of interoperability between content materials purchased outside the company on the one hand, and both proprietary content and in-house applications. Additionally, content interoperability is also an issue when converting custom, in-house training products into online products due to technical incompatibilities. In consequence, the shortage of high-quality content, especially for the soft skills area, is hindering the adoption of e-learning by institutions that still rely on e-learning as a short-term solution.

(d) Human Resistance

Enthusiasm for e-learning technologies is limited for those who do not have the skills to use the technology, think it is more cumbersome than traditional tools or simply prefer the human interaction provided in instructor-led training. Considerable evidence of the prevalence of e-learning in the workplace was gathered in surveys by IDC who found that 70% of respondents preferred instructor-led seminars and training.

Consistent with these results, 88% of learners and 91% of managers expressed the desire to have a trainer assigned to an e-learning experience (Masie, 2000). These statistics seem to indicate that e-learning solutions are blending with traditional delivery methods rather than supplanting them, a trend reflected in the growth of "surrounds" or online meeting places offering supplemental

materials and communication space for learners as a way of extending the instructor-led classroom. Blended learning, a mix of e-learning may serve as a transition step to allay fears and build learner acceptance of e-learning.

(e) Technological Barriers

Severe limitations of technology infrastructure also serve to hamper enthusiasm and the widespread use of e-learning technologies. These restrictions range from inadequate network speed and bandwidth capacity to incompatibility across different platforms and between different content materials. Bandwidth refers to the capacity of a communication channel to carry information (e.g., text, graphics, audio and videos). Insufficient bandwidth was rated as the most significant barrier in a survey where 65% of those surveyed indicated that increased transfer speed would result in increased usage for them. On a positive note, software, hardware incompatibility and low bandwidth are poised to improve rapidly as standards for interoperability are being developed.

3.11 Implications of E-learning in LIS-Education

In the present era of information super highway, e-learning opens new expectations and aspirations in LIS education, services and profession. Library and information services are rapidly changing as a result of:

- Demand for increased efficiency and accountability;
- Requirements for new services;
- Increased demand for 24x7 services and;
- Opportunities offered by e-learning.

The development and expansion of these new services and activities is often associated with changes in the organizational make-up such as the convergence of the library, ICT, or the expansion of the information services to include educational advancements, training and or e-learning. Library and information workforce in organizations that use online virtual learning environments, e.g. colleges and universities, are likely to be occupied with them at a number of different levels:

I. Strategic level

- Development of organizational learning and teaching strategy.

- Decisions about the selection and purchase of VLEs (Virtual Learning Environments).

II. Operations level

- Managing and advertising the VLE, e.g. configuring the system, providing learning spaces for developments, programmes or tutors.
- Managing and administering copyright and other intellectual property issues.

III. Teaching and learning

- Setting up and establishing specific e-learning environments such as design of site, design and development of materials, uploading of materials, identification of web links and organizing staff.
- Training staff and students in the use of the VLE, and also providing technical help and support.
- E-tutoring, either as a co-tutor on an academic or vocational program, or tutoring their own programmes.

Besides these, it is having an impact on individuals in the following areas:

New Opportunities:

E-learning offers new opportunities for library and information professionals to develop their knowledge and skills in a wide range of areas.

Acquiring information skills:

Sometimes e-learning activities involve traditional information knowledge and skills, and to get involved in working in a new ways with new groups of people. E-learning makes the information workers more confident and competent in the use of ICT.

Roles and responsibilities:

Information professionals are developing new roles and responsibilities within library and information unit through e-learning. In addition, many library and information workers have moved out of the information unit and are now managing learning centres, educational development centres or learning materials units.

Different professional collaboration:

In many organizations e-learning means that library and information workers are working together in new ways other professional groups, e.g. subject specialists, educational developers or ICT specialists. However, in some respects it is giving flexible opportunities that reduce time, money and travelling hassle.

3.12 Discussion

In present age, information needs are changing and demands of this profession are also varying. The change is enforced by many forces such as technology, demographic features, economic characters, etc. E-learning is now the global scenario and we must avoid confrontation. The LIS education is responding to these changes by making appropriate changes in its teaching-learning strategies. Adoption of e-learning in LIS is robust indicator of this response. As a developing country like India, it is arduous to design a new courses and new e-learning LIS-education. Lots of issues and challenges are involved with this task but as soon as it is put forward, it will surmount all those problems. The Indian LIS education too, is slowly but steadily making progress in this direction. Availability of appropriate and adequate infrastructure will add momentum to LIS e-learning in India. The establishment of the Indian Training and Education Network for Development (INTEND) by the Ministry of Human Resource Development, Government of India is a good approach of the government. The initiatives taken up by IGNOU are a good signal in the country. Web-based or electronic mode of teaching has become an important component of LIS Education in India. The use of new ICT by the Indian LIS Schools should be encouraged to produce professionals to manage knowledge resources in the electronic learning environment.

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Chapter-4

Learning Content Management Systems

CHAPTER-4
E-LEARNING CONTENT MANAGEMENT SYSTEMS

"Learning is what most adults will do for a living in the 21st century."
~ Perelman (1968-2012)

A Learning Content Management System is a sophisticated premeditated solution for planning, managing, and delivering all learning proceedings within an organization, including online, virtual classroom, and instructor-led courses (Greenberg, 2002). The primary key is replacing inaccessible and fragmented learning programs with a systematic means of assessing and raising skills and performance levels throughout the organization. International data corporation (IDC)'s white paper "Learning Content Management Systems: Comparative Analysis of Emerging Technologies" defines a learning content management system (LCMS) as a "system that is used to create, store, assemble, and deliver personalized e-learning content in the form of learning objects, also known as knowledge objects" (Brennan, Funke & Anderson, 2001a).

According to various authors, any Learning Content Management System encapsulates four components in its learning objects:

1. Learning objectives: general and specific learning goals for a lesson plan, scenario or course module.
2. Pre-assessment element: the learner is tested prior to teaching and a learner's personalized learning plan is generated as a result of the pre-test.
3. Learning content: the subject matter to be taught, in various formats like text, audio, graphics, videos and animation.
4. Post-assessment: following instruction, the learner is tested to assess its mastery of the content as delineated by the objectives.

But, there is one more component which is metadata or a label providing information on the content of the learning objects in an LCMS in order to catalogue, access and utilizes it. Metadata usually supplies details about duration of instruction, the target audience, or any prerequisite knowledge.

In essence, a learning object is the smallest entity in a LCMS and can be aggregated in various ways to form simple to complex learning scenarios. According to Ellis (2001) "learning objects, which are reusable, media-independent chunks of information organized by a metadata classification system and are modular building blocks of e-learning content."

4.1 Learning Management Systems (LMSs) and Learning Content Management Systems (LCMSs)

(a) Learning Management Systems:

E-Learning systems have usually been understood as Learning Management Systems (LMS) which mainly focus on administrative aspects of learning and on content delivery and support the behaviouristic drill and practice approach. LMS have evolved from the early days of Computer Based Training CD-ROMs (CBT), which only presented the learning content but also needed some kind of course and student management to organize who should learn what and when. LMS offer at least support for planning, organizing and managing learning such as course catalogues and registration, event schedules, assessment services, keeping learner records, organizing group and individual learning paths. In addition to that they have often been extended by functions for skill and competency management for tracking and controlling the personal development of employees and by modules for resource management to also organize trainers, rooms and other types of resources for instructor-led trainings.

Systematically listed by Siemens (2004), the most important functions and parts of an LMS are:

- Personalized learner portal: This module provides the personalized entry to the whole system and views to the most important personal information.
- Course catalogues and registration: These enables learners to access catalogue offerings, register, and enroll in the offerings. It also handles billing issues (which would require integration in e-commerce systems), notifications, schedule changes, waiting lists and drop policies and defines gathered skills when mastering the courses. A curriculum

manager tool helps to define and select the courses for the course catalogue and is tightly integrated with the competency management functions. Selected courses can be assigned to trainees individually by the trainers or course managers.

- Learner-records database, with user-profile and competency management for tailoring learning experiences to competence frameworks. Core components of this module are:
  - Learner records: contain stored information about the learner, such as job title, organization, location and skills acquired. These cannot be directly edited by the user. Personal preferences, such as delivery mode and language, may be edited by the user.
  - Learner tracking: Learner tracking tracks a learner's planned learning and progress through e-learning offerings by recording the history, and current status. A learning diary can also track all articles created and documents uploaded by the trainee.
  - Skill gap analysis and personal performance reports visualize the actual skill profile of a certain user, the target skill profile to e.g. reach a certain new position and the potential gap between these two. The gap can be closed by mastering appropriate courses. Trainers can examine the progress of their students by using progress customizable grade reports.
  - Management reporting tools (requires integration with performance management systems): With these tools managers can access a learning plan/history for each direct report in their reporting chain. They can approve registration and add to their employees' future learning plans. They can also review their employees' progress for both offerings and assessments. Additional tools support team forming according to a given skill profile. That way the LMS works as a support system for the production environment and e.g. can be directly linked to a project management system to form efficient project teams.

- Needs tight integration via interfaces with course catalogues, the assessment services and the content delivery system.

- Assessment Services: Pre- and post-assessments are integrated with learning content to deliver a comprehensive curriculum that provides feedback to both learners and managers and adds value to the overall learning experience. Pre-assessments enable learners to study only the necessary material for a task at hand, saving valuable time. Post-assessments provide results that are used to track completion status and are a key element for progress reporting.
- Resource Management: Resource Management assigns classrooms and instructors for instructor-led training and virtual events, managing the schedules for equipment, facilities, rooms, and instructors and storing additional attributes (e.g. number of trainees booked for a course to define the size of the room etc.). Ideally such modules also support optimization functions.
- Administration Management: Here I summarize all other administrative tasks which an LMS can support:
  - Easy administration of users, teams, courses & classes, resources and the system itself. Import of user and group information and integration into external directory services (e.g. LDAP or Microsoft Active Directory) have to be supported.
  - Course management: creating, modifying, removing, trainee specific assigning and monitoring of courses.
  - System management: Configuration, load and failure reports, resources monitoring etc. of the system.
  - Support of numerous roles, at least distinguish between learners, trainers, authors and administrators.
- Integration with learning-content management systems.

(b) Learning Content Management Systems:

Within the last two years a new term describing a different kind of e-Learning systems has been introduced: Learning Content Management Systems (LCMS).

An LCMS contains similar features as an (Web-) Content Management System but adapted to the needs for e-Learning (Marjanovic, 1999). Its main task is the storing and structuring of content files in a database, managing revisions and modifications, and ensuring that content is tagged for easy retrieval and reuse. Some of its key features are the availability of:

- A Learning Object Repository which supports different granularities of objects, such as :
  - Content Assets, which are the most granular type of objects. Content Assets are raw media such as photographs, illustrations, diagrams, animations, audio and video files, applets or simple text documents etc.
  - Reusable Information Objects (RIOs) are classified as a concept, fact, principle or procedure and are usually described by metadata which give some hints about the re-use of the object. To support reuse, RIOs already contains metadata to describe them.
  - Reusable Learning Objects (RLOs) are data formed by assembling a collection of (ideally 7±2) relevant reusable information objects to teach a common job task on a single learning objective and are self contained, like e.g. course chapters. RLOs are the first level of granularity where it makes sense to automatically assign its objects to learners based on their skill gap analysis. However this will only happen in systems with very advanced competency management functions, usually only courses, which are the next level of granularity, are assigned to users.
  - Learning Components are a result of bundling and sequencing several learning objects together, such as courses or lessons. Sometimes (i.e. Autodesk Content Strategy Molecular Model View (Hodgins, 2000) lessons and courses are handled at different levels because a course can consist of multiple lessons.
  - A Learning Environment is the combination of several learning components (i.e. a personal curriculum) together with learning support services, such as communication and collaboration tools.

The repository also provides sophisticated reusing and structuring tools to build up objects of a higher granularity, e.g. learning objects made of multiple information objects, or courses made of multiple learning objects (Downes, 2004).

- Meta-tagging for search capabilities according to approved standards such as LOM. Meta tagging supports the creation of metadata by tagging wizards and tools which can provide automatic extraction or conversion of metadata. The Meta tagging is tightly integrated into the repository. It is important to note that there exist two different kinds of metadata:
  - Metadata which is steadily bound to the data object, e.g. creation date, size, type etc.
  - Metadata which provides information about the use of the object, because data can be used in various ways and in different contexts. That one should not be stored together with the data, but separately in e.g. multiple areas of the repository for each incarnation. Into the same category falls meta-metadata, which is metadata about the metadata, e.g. the author(s) of the metadata.
- Workflow services
  - The Workflow services offer generic learning content development, review and release workflows, with the flexibility for each workgroup to select variables to customize to their requirements.
  - A mandatory component of all workflows is registering content and baseline metadata into the repository before releasing the content.
- Collaborative authoring and editing is tightly integrated with the Workflow services and the Learning Object Repository and
  - Provides all of the traditional content management functions for learning and content objects, including
    - creation/upload, modification, copying, moving, linking and removing,
    - version control,

- notifications, history and reporting of changes (auditing),
- fine grained access control with users, groups and role handling down to the level of single documents to provide personalized training content and even
- full text searching in addition to metadata and keyword searching mentioned above
- advanced features like multiple language support and link management

- Offers import/export and conversion of various content types and complete packages from and to 3rd party vendor systems.

- Authoring
  - Form-based authoring tool for (simple) online created content. Ideally this tool has a built-in quiz tool included, which can be used to create the following types of tests:
    - single/multiple choice
    - image map questions
    - list matching questions
    - randomized and calculated questions
    - timed quizzes
    - fill in-the-blank tests
    - short answer tests
  - Tight integration of external authoring tools enables content creators to write more complex learning objects such as text, graphics, and assessment questions that can be seamlessly linked to any level of the learning hierarchy.
- Personalized and adaptive content delivery according to existing standards such as AICC, SCORM and IMS. The content delivery needs to be tightly integrated with an LMS to pass on all relevant activity and progress data (i.e. assessment results) to the according skill and record management modules of the LMS.

It also makes sense to offer the already built-in collaborative and knowledge construction features for students for their personal workspace. That way the system could support the cognitivistic and constructivistic learning paradigm.

The growth of e-learning in organizations and institutions has strongly influenced the evolution of computer-based training architectures such as learning management systems and learning content management systems, in response to demands for better administration of training with personalized developmental paths, up to date records on training activities.

4.2 Characteristics and Generic Components of LCMS

Brennan, Funke and Anderson (2001b) identify four main components of an LCMS:

1. A learning object repository: learning objects are stored in a data repository, where they can be accessed and used either as a single entity or as sets of aggregated entities towards the design of learning modules or complete courses. Being media-independent, the end product may be deployed in a variety of formats, on the web, CD-ROM or through print materials, without content distortion. The integrity of content together with the media versatility of learning objects is made possible by the programming language XML, which separates content from the programming code.
2. An automated authoring application: instructional design templates with lists of choices for learning objectives, type of media preferred, characteristics of the target audience and existing learning objects related to the subject matter, allow authors whether instructional designers or subject matter experts (SMEs) to rapidly assemble courses or even convert an organization's content into reusable learning objects. The application also enables online collaborative authoring among geographically dispersed authors.
3. A dynamic delivery interface: based on the pre-test results or simple search queries, the tool delivers the content captured in learning objects via a user friendly interface which can be customized to reflect an organization's logo and theme colours. The application may include additional capabilities such as user tracking, information links tracing and assessment with feedback.

4. An administration application: the tool can manage learner profiles, course catalogues, track and report learner's progress or send the information to another system with more powerful administrative capability like a learning management system (LMS). Although the acronyms are often used interchangeably, an LMS and an LCMS have slightly different features and strengths, the latter which are documented and explained below.

4.2.1 Specific features of LCMS

An LCMS power lies in its efficient, training administration capabilities. LCMS, also known as training management systems, training administration systems, integrated learning systems, can register students for online or offline courses, launch online courses and assign the appropriate learning resources (e.g., providing access to lab equipment for e-learning experiments), track student's progress and modify report test scores and overall manage the communities of users. With the help of integrated collaboration tools including email, discussion forums and chat rooms, an LCMS can allow users to engage in joint work and learning. Some LCMS have a special functionality for competency mapping and skills assessment to establish a competency profile, a (curriculum) training plan to bridge the competency gap with the corresponding training resources, and an evaluation of the impact on performance.

An LCMS's strength resides in its content management, delivery and storage abilities. Sometimes described as providers of adaptive learning, LCMS can assist learners in selecting adequate combination of learning resources, generate personalized instruction plans by assembling different "chunks" of content, closely track the user interaction with the learning material to adjust the delivery instruction (update the content of the learning path) accordingly and can provide comprehensive reports on tests results. An LCMS allows an organization to do more extensive tracking of learner's interaction with its content than the top-level tracking allowed by an LMS, where tracking is generally restricted to course completion and rudimentary test results (Brennan, Funke & Anderson, 2001c).

The distinctive features of LCMS are seen as being complementary in the literature on the topic. Tight integration between an LCMS and an LMS can

greatly enhance their mutual performance. For instance, user data such as information on usage of programs, learner's progress, and test scores monitored by the LCMS can be fed into the LMS for reporting purposes or the LMS can point multiple users to appropriate learning resources and enable them to launch the required learning objects stored and manipulated by the LCMS.

4.2.2 Issues about integration of LCMS in an organization

Several key variables have been identified by researchers studying the conditions necessary to leverage the full benefits of LCMS within organizations. These include:

4.2.2.1 Interoperability

This term refers to seamless integration of the LCMS with other third party content, management and authoring tools, databases such as ERP systems and off-the-shelf training products. In implementing an LCMS, an organization needs to ensure that it can utilize the functionalities of the LCMS platform with other software and courseware it already owns. A word of caution is essential to know that many LCMS only offers tracking with their specific, often limited authoring tools. These LCMS fail to integrate with widely used authoring applications, be it Macromedia Autorware, Dreamweaver with course builder or Flash, and do not accommodate either custom courseware or off-the-shelf, and low cost courseware from some commercial organizations. In this case, an organization's potential to leverage online learning deployment is severely restricted.

4.2.2.2 Standards

The current absence of a single standard for content interoperability as well as for metadata tagging, and data tracking leads to informal coalitions of vendors that pledge product compatibility among themselves (Connolly, 2001). To offset the uncertainty surrounding standards, four recognized regulating bodies are currently developing industry-wide standards. A first project on standards for web-based course management is run by the Aviation Industry CBT Committee (CBT-AICC) which has certified a number of products for the past decade. The second LCMS standard called SCORM (Sharable Content Object Reference Model) piloted by the U.S. Department of Defense's ADL

(Advanced Distributed Learning), draws together the efforts of the AICC, Institute of Electronic & Electrical Engineering (IEEE), and the Instructional Management Systems Global Learning Consortium (LMS). It is, however, observed that the difference between claiming AICC compliance, which is tested by the vendor, and AICC certification, which is tested by a third party for AICC is currently a source of confusion for potential LCMS buyers. Until all LCMS support both standards, organizations should thoroughly examine the degree of compliance of the relevant LCMS with the current industry draft standards and specifications.

4.2.2.3 System Longevity

A major challenge for organizations is selecting an LCMS which will afford it a reasonable length of usage. In claims similar to those made by Draft (2000) with his model of ecological change, Barron (2000) notes that in the upcoming two years, a market consolidation of LCMS vendors is likely to reduce their approximate current number of 100, to a small portion of that figure. This trend, in part due to the rapid technological advances typical of the emerging LCMS sector in which yesterday's innovation becomes obsolete the next day, leads to dominant vendors establishing alliances to output best-of-breed products where the LCMS is the integration pivot for the other "turnkey systems". From the vendors' standpoint, these fully integrated learning systems serve as best guarantee against future innovations in the current absence of strong interoperable standards. In response to this issue of system longevity, a new model has emerged where vendors jostle to offer "turnkey hosted services" to organizations. In the ASP model, an organization can rent an LCMS rather than buy it and thus continually update its information technology (IT) architecture.

4.2.2.4 Scalability

The ability to deploy enterprise-wide learning solutions and to accommodate various sizes of learner population is critical, especially for global, very large or fast growing organizations. Since e-learning, including multimedia and online learning, is costly to develop, economies of scale become crucial for the LCMS to be a profitable strategy. In their study of e-learning, Hambrecht

(2000) comments that organizations will target high return on investment through the deployment of course delivery platforms capable of supporting millions of users and utilizing multiple and effective distribution channels. Organizations seeking an LCMS able to address immediate issues of large volume transactions while allowing for future growth must look for systems with an enterprise wide perspective.

4.3 E-Learning Content Management Softwares

E-learning softwares are the starting points of any online delivering system. They are the building blocks which form the critical component of any online learning program. E-learning softwares are more specialized, well crafted educational tools that incorporate a variety of organizational, administrative, instructional and technological components (Moore and Kearsley, 2005), a framework to help instructors administer the classroom more efficiently. They are widely adopted by academic institutions and instructional designers in order to fulfill specific needs and requirements in a field of ever increasing demands for effective, fast and pedagogically appropriate education and training. These softwares are called as learning management systems and learning content management systems in online terminology. Various commercial and open source softwares as listed in Wikipedia are as under:

Open source Learning Content Management Systems

(i) aTutor
(ii) Canvas by Instructure
(iii) Chamilo
(iv) Claroline
(v) Dokeos
(vi) eFront
(vii) Fedena
(viii) ILIAS
(ix) Moodle
(x) OLAT
(xi) Sakai
(xii) Totara LMS
(xiii) WeBWorK
(xiv) Joomla

Proprietary Learning Content Management Systems

(i) Blackboard Learning System
(ii) CERTPOINT Systems Inc
(iii) Desire2Learn
(iv) DoceboLMS
(v) eCollege
(vi) Edmodo
(vii) GlobalScholar

(viii) Glow (Scottish School National Intranet)

(ix) HotChalk (x) Informetica

(xi) ITWorx CLG (Connected Learning Gateway)

(xii) Latitude Learning LLC (xiii) Meridian Knowledge Solutions

(xiv) My Big Campus (xv) Ning

(xvi) QuestionMark (xvii) Saba Software

(xviii) SAP (xix) Sclipo

(xx) Schoology (xxi) SharePointLMS

(xxii) SSLearn (xxiii) Spongelab

(xxiv) SuccessFactors (xxv) Taleo

(xxvi) TeamWox (xxviii) Vitalect

(xxix) WebStudy Learning LMS

4.3.1 Advantages of Open Source Software

Most debated advantages and disadvantages of open source software are; total cost, other financial and forensic subjects (Okmen, 2008). Advantages of using open source software can be summarized as follows:

Architecture:

There is no single feature on which the future of the software depends: Open source architecture enables the user to take away the software company dependency risk that originated the code chosen to stop development and increase maintenance and development fees.

Confidence:

Popular open source software is examined by many developers and software experts so; it is filtered and cleaned of errors. In this way, with the increase in quality, the fundamental aim of software production and the process of usage, user's confidence in the software increases.

Sensitivity and flexibility for User Requirements:

Open source software is often updated more frequently than proprietary software. Most of the time, these changes reflect the needs of the user and the developer community.

The Support of Innovation:

The Production process of open source software is improved by a broader range of diverse and creative ideas. In this way, each developer has equal rights to reflect his own innovative thoughts to the product.

Security:

Open source software provides security according to the level of user requirements but usually not at the level of commercial software. Users with commercial software do not have access to the underlying contents of the code, so they do not have a definite knowledge of their security. Total cost of ownership has been defined after the comparison between open source software and proprietary software as follows:

- Hardware costs (contains purchasing cost and maintenance)
- Direct software costs (contains purchasing cost, support and maintenance)
- Indirect software costs (especially license management)
- Personnel costs
- Supporting costs
- Breakdown period costs

4.3.2 Disadvantages of Open Source Softwares

Open source softwares gained huge popularity in the field of IT in recent years. This is mainly because open-source software is free to use and its greatest advantage is that it can be modified as per the needs and requirements of the organization because its source code is available and free to change, alter or modify. As it is developed by a non-profit community, it has some disadvantages as well. Some of the main disadvantages of open source softwares are listed as under:

- Unmotivated learners or those with poor study habits may fall behind
- Lack of familiar structure and routine may take getting used to
- Students may feel isolated or miss social interaction
- Instructor may not always be available on demand
- Slow or unreliable Internet connections can be frustrating
- Managing learning software can involve a learning curve

- Some courses such as traditional hands-on courses can be difficult to simulate

Knowing e-learning advantages and disadvantages helps in learning software selection as well as online distance learning programs structure and selection. It is important to know the merits and demerits of e-learning to make a decision.

4.4 Major Open Source E-Learning Content Management Systems

In an e-learning process, open source softwares can be used in many different phases such as application software that performs learning content preparation and in LCMS, which provides learning content presentation in a web based environment and as web server software (e.g., APACHE). Due to the advantages of e-learning, schools and higher institutions are adopting these new learning technologies and increasing their investments in it. However, along with the advantages, installation and support costs appear to be big disadvantages compared to a traditional learning environment. These disadvantages can be reduced to a great extent by the use of open source software which provides further gains. Statistical studies show that open source web server software is again found mostly preferred and widely used in learning content presentation in a web based environment such as (Netcraft Survey, 2008). The investigator used Joomla content management system for the design and development of an e-learning portal for library and information science because of the various factors and advantages described intricately in chapter-6.

4.4.1 Dokeos

The system Dokeos support online and collaborative authoring. Delivered services are blogs, wikis and discussion forums. Also there exist possibilities to enlarge the services with different modules such as PowerPoint to online course, contouring, videoconferencing. There is a multi-criteria search engine, build our own templates and MS-Office compliance to increase the productivity. It has a property of data encryption for security to avoid leaks and can articulate online activities and classroom exams. Figure-4 shows the services, activities and learning unit-course in Dokeos.

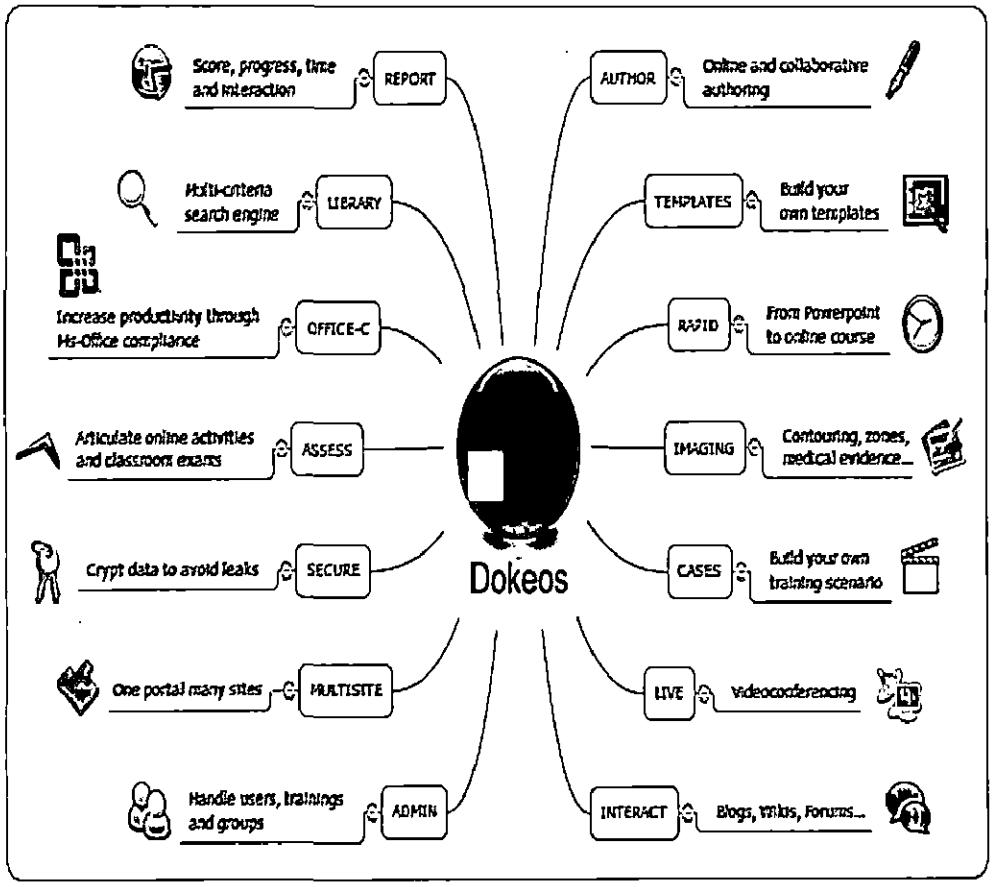

Figure-7: Dokeos Activities (http://www.dokeos.com/fr/node/73)

4.4.2 LAMS

Learning Activity Management System, or LAMS, is an e-learning application based at the Macquarie E-learning Centre of Excellence (MELCOE) at Macquarie University, Australia.

LAMS claims to provide teachers with a "highly intuitive, visual authoring environment" for creating sequences of learning activities. Activities can include a range of individual tasks, small group work and whole class activities based on both content and collaboration.

LAMS is also developed in Java and use the JBoss application server. Versions that integrate with other e-learning systems like Moodle, Blackboard, and Sakai are also available (http://www.lamsinternational.com/).

4.4.3 Claroline

Released under Open Source license, the Claroline platform allows hundreds of organizations from 93 countries to create and administer courses and

collaboration spaces online (http://www.claroline.net/?lang=en). Each course space provides a list of tools enabling the teacher to:

- Write a course description
- Publish documents in any format (text, PDF, HTML, video...)
- Administer public and private forums
- Develop learning paths
- Create groups of students
- Prepare online exercises
- Manage an agenda with tasks and deadlines
- Publish announcements (also by e-mail)
- Propose assignments to be handed in online
- See the statistics of the users activity
- Use the wiki to write collaborative documents

Adjustable to various training contexts, Claroline is not only used by schools and universities, but also by training centres, associations and companies. The platform is customizable and offers a flexible and custom-made working environment. The Claroline platform is organized around the concept of spaces related to a course or a pedagogical activity. Each space provides a list of tools that enable to create learning contents, manage training activities and interact with the students. Claroline has been developed following teachers' pedagogical experience and needs. It offers intuitive and clear spaces administration interface. The daily platform management doesn't require any specific technical skill. The platform is quickly installed and the use of any web browser allows managing the various course sections and enrolled users fluently.

4.4.4 ILIAS

ILIAS (www.ilias.de/) began at the faculty of business administration, economics and social sciences at the University of Cologne in Germany. ILIAS is a powerful Open Source Learning Management System for developing and realizing web-based e-learning. The software was developed to reduce the costs of using new media in education and further training and to ensure the maximum level of customer influence in the implementation of the software.

ILIAS is published under the General Public License and free of charge. In addition to e-learning features course, group and content management, ILIAS has support for Web 2.0 functions like RSS, podcasting, and Google Maps. For Web services a SOAP interface was developed. ILIAS allows efficient creation of courses and course materials. It offers standardized tools and templates for the learning and working process including integrated navigation and administration.

ILIAS offers an integrated environment for the creation and enforcement of tests & assessments. This can be used for the monitoring of learning progress by the users as well as the tutors and examiners. ILIAS Test & Assessment supports multiple choice, single choice, allocation questions, cloze questions (free text, select box), ordering, matching, hot spot and more question types. ILIAS accomplishes the e-learning-standard SCORM 1.2 and first of all open-source-LMS; it achieves the maximum conformance level LMS-RTE3. It also supports LOM metadata standard, AICC and IMS-QTI. ILIAS supports standard ways of communication as chats, forums and mails. The personal desktop includes an awareness function that shows users that are currently online. ILIAS also sends information via RSS to the user and displays external RSS feeds in the system.

4.4.5 Sakai

Like OLAT, Sakai is a Java-based e-learning system developed by an international alliance of universities, colleges and commercial affiliates. Sakai's core tools like forums, chat rooms, and message centre can be augmented with tools designed for a particular application like assignments, syllabus, and WebDAV. Sakai claims to be in production at over 150 institutions and being piloted by over 100 more.

The latest Sakai 2.5 series has changes at both the tool layer and framework level. One new provisional tool has been added, while two existing provisional tools have been promoted to the enterprise bundle. Sakai provides users with a suite of capabilities that best meet the needs of today's teachers and learners. The functionality can be assembled to create spaces for a variety of purposes. The list of Sakai current core tools is provided below. In addition, there are a

large number of add-on tools (called "contrib") available that are in use by many Sakai institutions.

The Sakai CLE is a flexible, enterprise application that supports teaching, learning and scholarly collaboration in either fully or partially online environments. Sakai also has a robust and full-featured online portfolio system built-in. The Sakai CLE is distributed as free, open-source software, which offers the ultimate in flexibility and avoids the risks of vendor lock-in and escalating license costs.

Instructors teach in a variety of different styles using a wide array of methods. Sakai meets the needs of the institution, the individual instructor and students through its highly customizable nature. Sakai's architecture is modular and individual instructors can select the tools they want available for their class. Or you can configure sites that are specifically designed for research collaboration or administrative work groups (www.sakaiproject.org/).

4.4.6 OLAT

Unlike most of the e-learning applications, OLAT (Online Learning And Training) is based on Java and is Apache Licensed web application or so called Learning Management System that supports any kind of online learning, teaching, and tutoring with few instructive restrictions. OLAT is free open source software and has been developed in 1999 at the University of Zürich. OLAT supports various E-learning standards such as IMS and SCORM. Many extension points have been added to the system in version 4.0, which makes it very easy to extend the LMS functionality. In version 5, new functions like Wiki, Calendar, AJAX Beta Mode, and Full text Search have been implemented. Version 6.0 comprises a new and improved layout based on a usability evaluation. The most recent Version 6.1 provides full scalability, meaning OLAT can be run on a cluster of servers. This is crucial to maintain full speed when large numbers of users are accessing simultaneously.

OLAT has many features which are typical for e-learning platforms like content managing, forums, file discussions, quizzes with different kinds of questions, wikis, surveys, chat, submission module (for exercises), grading

module, time marker for video data, scalability and can be run as a cluster with Multi-language support (www.olat.org/).

4.4.7 Fle3

Fle3 (http://fle3.uiah.fi/), a web-based learning environment is server software for computer supported collaborative learning (CSCL). Fle3 is an open source and free software released under the GNU General Public License (GPL). The license is protecting our freedom to use, modify and distribute Fle3. It is designed to support learner and group centered work that concentrates on creating and developing expressions of knowledge (i.e. knowledge artifacts) and design. Fle3 contains three learning tools and several administration tools with support to 16 different languages. Various Fle3 tools like web tops, knowledge building and jamming tools are used to store different items, carry out knowledge building dialogues and shared space for collaborative construction of digital artifacts.

4.4.8 MOODLE

MOODLE is Web-based e-learning open source software which is described most preferably as a course management system to help educators create "effective online learning communities." Open source softwares are rapidly developing, and new alternatives for non-profits organizations are mushrooming and maturing. An open source learning environment, MOODLE is becoming widely adopted by universities and other educational institutions. Managing an LMS is a complex chore. MOODLE does not hide this complexity and its detailed on-line help, examples and sensible defaults assist users in installing, administering and using the LMS (Ambrosi, Bianchi et al., 2006).

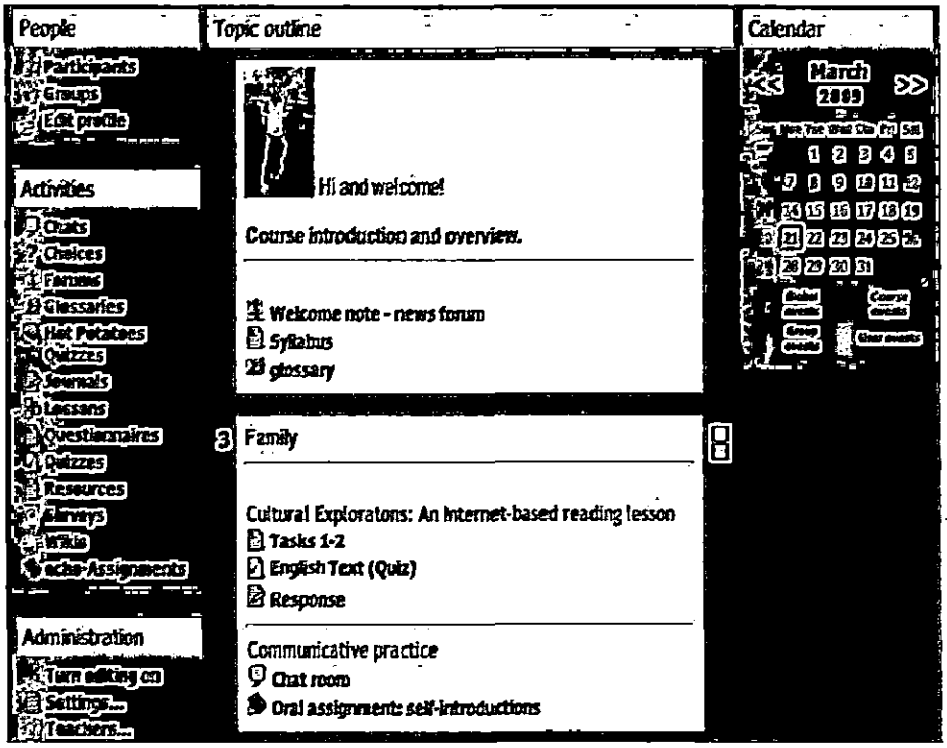

Figure-8: Sample perceptive interface of Moodle

Moodle allows integration of a wide range of resources which include any kind of html-based or text-based documents, multimedia resources (audio/video & graphics), power-point presentations and flash-based applications. Lessons and tasks within Moodle can also be linked to any of the resource that is uploaded in a server or that is available on the Internet. Moodle has a built-in html editor and glossary module which allows more sophisticated presentations along with animations and to create own text, course or site dictionaries.

4.4.9 Joomla

Joomla is a free, open source content management system which offers an easy and dynamic website, portal and powerful online application building. It allows us to easily create and manage a dynamic website and is written in PHP, uses object-oriented programming (OOP) techniques. Since the release of first version of Joomla 1.0 in September 2005, it has released and upgraded many versions since then and the latest full version available is 3.0 Alpha-1 and recently released 2.5 in the month of February of 2012 with more additional features.

Until now, Joomla was only compatible natively with MySQL databases but its latest release comes with multi-database support, including Microsoft SQL server. It also brings improved search, automated script updates and auto-complete functionality within the article editor, among others. The security factor has also been modified with as many as 240 major vulnerabilities fixed and a lot many miscellaneous elements, such as banners, news feed, links, etc. are dumped under its Components section (http://www.joomla.in/).

Development

On August 17, 2005, Joomla was developed by the fork of Mambo, the name which was trademarked by Micro International Pvt. Ltd. who formed a non-profit foundation with the stated purpose to fund the project and protect it from lawsuits. A website called OpenSourceMatters.org was created for the distribution of information to users, developers and web designers. On September 1, 2005, the new name 'Joomla' was announced derived from the spelling of *Swahili* word 'Jumla', which means "all together" or "as a whole". Since then, Joomla and its developers have won many awards of excellence for the development of the world's most popular open source CMS.

Summary features

Joomla is a completely database driven site engine, whereby news, products or services sections are fully editable and manageable. It has easy to use graphical administrative interface with powerful WYSIWYG editor for creation and editing of pages. It supports creation of nested or flat content hierarchies. It runs on Linux, FreeBSD, Mac OSX server, Solaris, Windows NT/2000 via the (Microsoft Web Platform Installer) and AIX.

(a) Easy Installation

There are two main ways of installing Joomla, the browser installation and the manual installation, but for both of the methods, we must have a working Apache web server with PHP and MySQL database. Browser installation is a four step process with pre-installation check and GNU/GPL (General Public license). For manual installation, we must ensure that PHP has been compiled with support for MySQL, zlib and XML in order to successfully run Joomla. We need to download a complete package of Joomla from its main site which

is mainly in gzip or tar format. After unzipping the package, we can install the software by following the instructions given in the main installation documentation support of the Joomla website.

(b) Fantastic Design

Joomla allows uploading and switching site templates right from our administration panel and we can choose hundreds of free Joomla templates provided by their site ground.

(c) Intuitive Administration

Joomla CMS is a multi functional open source application for creating websites and web portals. With a regular, functional CMS, it is hard to keep track of all pages, menus, users etc. but with Joomla's easy to use interface, everything is in its right place and easily accessible. With its multiuser and multilevel environment, many users can interact and contribute to the development of a Joomla-based site. Users can be assigned to different groups with different privileges.

(d) Extendable

Joomla is having one of the biggest communities of developers that distribute its free application extensions daily. There are thousands of components, modules and plugins that allow us to develop a site without being a developer.

(e) Flexible

We can build all kinds of websites with Joomla, not just a forum, blog, e-commerce website or news portal. All these sites can be made in a single application and are managed from a single administrative area. This provides unparalleled flexibility for the site owner. News, products, or services sections are fully editable and manageable and fully customizable layouts including left, center, and right Menu boxes.

(f) Secure

Being an open source application, it is daily tested by hundreds of users. It needs to be properly configured and hosted on a quality server. Joomla is reliable and secure solution even for big corporate website working with sagacious information.

Joomla Core Features

There are four main core features of Joomla CMS which makes it smarter than other open source e-learning software in the same class. They are:

(a) Components

(b) Modules

(c) Plugins

(d) Templates

Components

A component is more or less a kind of extension in Joomla. Components are like mini applications which serve as main functional units. They are usually displayed in the main content area of a template or in the center depending on the template. Under the components section, we have six main sub-components:

- Banner
- Contacts
- Newsfeeds
- Polls
- Search
- Weblinks

Modules

Modules are informal, flexible and lightweight extensions used for page rendering. They are often like boxes set around a component on a distinctive page. Some modules can be linked to components; however, they do not need to be linked to anything and can just be static html or text. The main elements in modules component are:

- Archived Content
- Custom HTML
- Footer
- Menu
- News Flash
- Random Image
- Banners & Feed
- Breadcrumbs
- Login
- Most Read & Latest News
- Polls
- Related Items

- Search
- Statistics
- Who's Online
- Sections
- Syndicate
- Wrapper

Plugins

A plugin extension in Joomla provides functions which are allied with trigger events. A whole set of core plugin events in Joomla can custom events and when a particular event occurs, all plugins gets activated and then executed in sequence. This extends the functionality of Joomla in a powerful way. It also offers extension developers an approach to allow other extensions to respond to their actions, making them extensible.

The main components in plugins are:

- Authentication (Joomla!, LDAP, OpenID, GMail)
- Cache
- Code Highlighter (GeSHi)
- Email Cloaking
- Editors (TinyMCE 2.1 & Xstandard Lite for Joomla)
- Editors-XTD (Image, Page Break, Read more)
- Legacy
- Rating
- Search (Categories, Newsfeeds, Sections, Contacts, Content, Weblinks)
- SEF (Search Engine Friendly URLs)
- XML-RPC (Blogger API, Joomla API)

Templates

Templates are the kind of extensions in Joomla, which allows us to change the looks of our site. We can use them to make our site as we want to design. There are 3100 free and 150 professional high quality Joomla paid templates to choose from. Out of them, four templates are pre-installed with Joomla. No specialized programming language is required to customize or build these templates.

4.5 Discussion

Software plays an important role in structuring and scheming of an e-learning system. The whole infrastructure is dependent on the type of softwares handling the system. Various softwares are available in the e-learning market and many new open source softwares are coming up due to the rising global software demand and competition. We are witnessing radical changes in the ways of delivering knowledge by institutions and organisations throughout the country. The use of learning management systems and content management systems have proliferated within few years but one still need to understand how it works before we can drive it. The latest generation of CMSs from the major vendors shows signs of moving ahead in this direction, but still there is much work to be done.

We lack a full-fledged E-learning system in library and information science. Here is the need to develop an e-learning system in LIS education after evaluating some of the select well known web-based learning systems, which provides free access to LIS professionals, teachers and students. These learning and content management systems require for more expertise, skill, patience and dedication than is desirable. The technology is getting more sophisticated and flexible in order to satisfy users with regard to content management and groupware functions. Since, Joomla is a kind of software which is easy-to-learn and handle. There is no need to hire any IT specialist and there have been many discussions and complaints about the Moodle interface. For any problems with Moodle, there isn't any helpdesk and one has to look for solutions on forums which are the only support option while as Joomla has a guaranteed helpdesk to support which is already included in the license price which makes Joomla the preferred one over other authoring tools. After analyzing the attributes like accessibility, compatibility, maintainability and usability of various softwares, the investigator chooses *Joomla* for the design and development of an e-learning prototype namely 'LISLearn.'

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Chapter-5

Data Analysis and Interpretation

CHAPTER- 5
DATA ANALYSIS AND INTERPRETATION

"If you can't explain it simply, you don't understand it well enough."

~ Albert Einstein (1879-1955)

5. Introduction

As the aim and objective of the thesis is to evaluate the e-learning systems of select universities and to study the design and development of e-learning solutions in library and information science, relevant data was collected from the point of view of faculty members, proficient staff and students. The chapter includes the analysis of responses received from the faculty members of Department of Library and Information Science from select twenty universities, responses from e-learning experts and students pursuing various e-learning courses from select eight universities whose list is given as under:

(i) Aligarh Muslim University (1875), Aligarh, Uttar Pradesh
(ii) Banaras Hindu University (1915), Varanasi, Uttar Pradesh
(iii) Bangalore University (1886), Bangaluru, Karnataka
(iv) Calcutta University (1857), Kolkata, West Bengal
(v) Delhi University (1922), New Delhi
(vi) Guru Nanak Dev University (1969), Amritsar, Punjab
(vii) Indira Gandhi National Open University (1985), New Delhi
(viii) Jammu University (1969), Jammu, Jammu and Kashmir
(ix) Kashmir University (1956), Srinagar, Jammu and Kashmir
(x) Karnatak University (1949), Dharwad, Karnataka
(xi) Kerala University (1937), Thiruvananthapuram, Kerala
(xii) Kurukshetra University (1956), Kurukshetra, Haryana
(xiii) Madras University (1857), Chennai, Tamil Nadu
(xiv) Mangalore University (1980), Mangalagangotri, Karnataka
(xv) North-Eastern Hill University (1973), Shillong, Meghalaya
(xvi) Osmania University (1908), Telangana, Hyderabad
(xvii) Punjabi University (1962), Patiala, Punjab

(xviii) Rajasthan University (1947), Jaipur, Rajasthan

(xix) University of Mumbai (1857), Mumbai, Maharashtra

(xx) University of Mysore (1916), Mysore, Karnataka

The list of eight other universities selected for investigation which provide e-learning in Management and Library and Information Science fields in India is given as under:

(i) Amity University (2002), Noida U.P

(ii) Delhi University (ILLL, 2007), New Delhi

(iii) Don Bosco University (2007), Azara, Guwahati

(iv) Indira Gandhi National Open University (IGNOU, 2009)

(v) Kashmir University (EMMRC, 1987), Jammu and Kashmir

(vi) Mumbai University (DLLE, 1994), Mumbai, Maharashtra

(vii) Symbiosis International University (2002), Pune, Maharashtra

(viii) The Global Open University (2006), Nagaland

The chapter is divided in to two parts, each part consisting of responses received in the form of separately drafted questionnaires for LIS faculty members, experts of the institutions providing e-learning and the students pursuing various e-learning courses. Analysis has been carried out with the help of various statistical tools, tables, graphs and textual presentations.

5.1 Part-1 LIS Faculty Member's Response

A total number of 108 questionnaires were drafted and designed for Library and Information Science faculty members and sent online, using Kwik Survey, to twenty universities (20) across India. Out of the total 108 questionnaires, only 84 responses were received back in which 3 were incomplete, while as one questionnaire was rejected and 21 did not responded. Only 80 complete questionnaires were selected for analysis. The analysis of the response received is listed as under:

5.1.1 Knowledge of Faculty Members about Computers and Internet

Computers and internet, both are considered as essential components of an e-learning system. The teaching staff must be dexterous and skillful about the use of computers and internet, so that the lessons are prepared and delivered more

effectively and efficiently. Evaluation of the knowledge about awareness of computers and internet of various faculty members has been centered as follows:

Table-2 Knowledge about Computers and Internet

Level of knowledge	No. of Responses	% age of the Response
Excellent	17	21.25%
Very Good	18	22.50%
Good	13	16.25%
Average	32	40.00%
Poor	0	0.00%
Total	**N=80**	**100%**

As ascribed from the above table-2, most of the respondents held that they have an average knowledge about computers and internet. Rest of the participants (60%) either said that they have an excellent, very good or good knowledge about the use of computers and internet. None of the participants has poor knowledge regarding computers and internet. This means that all the faculty members have ample knowledge about the use of computers and internet which is a very good sign for the implementation of e-learning, its understanding and use in the academic institutions in general and Library and Information Science in particular.

5.1.2 Rate of awareness and knowledge about E-Learning

E-Learning is delivered through various means and staff members must position, blend and associate those means with traditional form of learning. Rate of awareness and the preparedness about the acceptance of e-learning and the use of various e-learning modes vary from person to person. Those who are not having good hands on e-learning must keep themselves updated and continuously in practice, so that the student, at any point, does not feel it ineffective or inefficiency of teachers.

Table-3 Awareness and knowledge about E-Learning

Level of awareness	No. of Responses	% age of the Response
Excellent	0	0.00%
Very Good	28	35%

Good	20	25%
Average	32	40.00%
Poor	0	0.00%
Total	**N=80**	**100%**

As attributed from the above table-3, most of the faculty members (40%) have average knowledge about e-learning and rest of the responses are either good or very good. None of them ascribed that they have excellent knowledge about e-learning. Here is a point of concern about the average knowledge of most of the faculty members which needs to be triumphed over so as to understand all pros and cons of the e-learning system and to effectively deliver as per the student's expectations.

5.1.3 Knowledge about the number of institutions providing E-Learning at National Level

As seen from the table-4 that a total of 67 (83.75%) faculty members are knowledgeable about 1-3 e-learning institutes at national level. While 12 (15%) are aware about 4-7 institutes across India and only one person is well known (more than seven institutes) about e-learning institutions and organizations at National level.

Table-4 Knowledge of e-learning institutions at National level

No. of Institutions	No. of Responses	% age of the Response
1-3	67	83.75%
4-7	12	15%
More than seven	1	1.25%
None	0	0.00%
Total	**N=80**	**100%**

The above table clearly depicts that most of the faculty members (67%) have not as much of knowledge about the institutions providing e-learning at National level. This illustrates that e-learning is in its budding phase in India till it will be known to masses and the success of e-learning is vivid in the coming years which can also have a greater impact on e-learning economy

5.1.4 Knowledge about the number of institutions providing E-Learning at International Level

A total of 72 (90%) faculty members are found to be knowledgeable about e-learning institutes at International level. While only 8 (10%) have awareness about 4-7 institutions and none is having any sound knowledge of e-learning institutes all over the world.

Table-5 Knowledge of e-learning institutions at International level

No. of Institutions	No. of Responses	% age of the Response
1-3	72	90%
4-7	8	10%
More than seven	0	0.00%
None	0	0.00%
Total	**N=80**	**100%**

The instructors and the faculty members in Library and Information Science education need to keep track of all the changes, developments, designing applications, management, e-learning standards and delivering of online instruction. This will help them to respond to any difficulty which might come during the designing and delivering of e-learning (Table-5).

5.1.5 Participation in any formal training programme on e-learning or e-Resource creation

From the responses received in this regard, it is found that only few (5%) of the total faculty members have participated in a formal training programme on e-learning. This reveals that faculty members are not fully aware about operational functioning of e-learning systems and the institutions/organizations need to organize training programs from time to time on e-learning and resource creation so as to setup an efficient delivering staff.

Table-6 Participation in formal training programme on e-learning

Options	No. of Responses	% age of the Response
Yes	4	5%
No	76	95%
Total	**N=80**	**100%**

The four faculty members have participated in the following e-learning courses:

- EMMRC Kashmir university course on e-learning.
- Managing and creating institutional repositories for school communication.
- UNESCO Bangkok e-learning series on information and communication technology in education.
- Gate e-learning programme

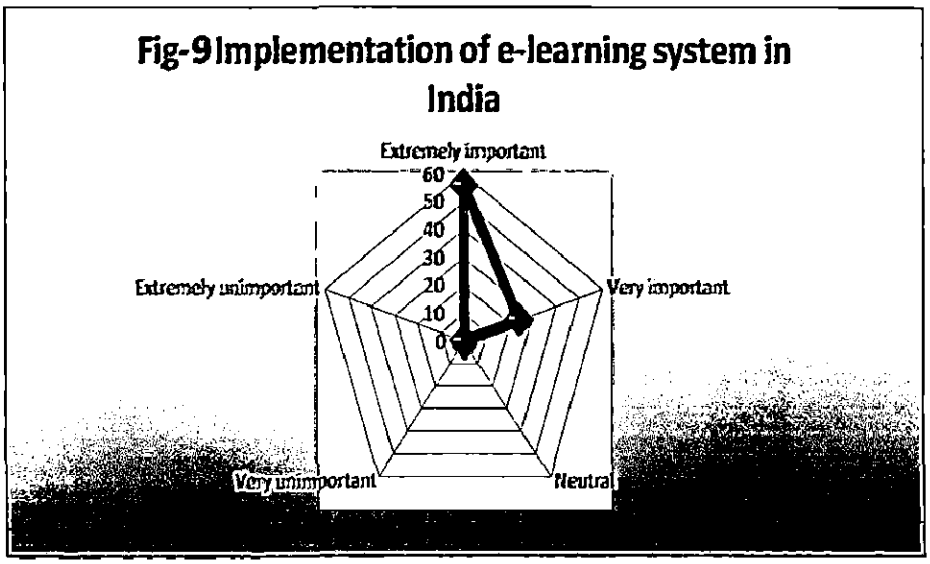
5.1.6 Implementation of e-learning system in LIS-Education in India

The impact of information in all spheres of society coupled with the utilization of IT development for access and utilization of information are dramatically changing the face of the library and information institutions. Due to the changing trends in methods of teaching and ways of delivering, nearly 56 (70%) of the faculty members responded that it is extremely important to implement e-learning system and 24 (30%) found it to be very important to incorporate and implement e-learning systems in Library and Information Science education in India.

Table-7 Implementation of e-learning system in India

Importance	No. of Responses	% age of the Response
Extremely important	56	70.00%
Very important	24	30.00%
Neutral	0	0.00%
Very unimportant	0	0.00%
Extremely unimportant	0	0.00%
Total	**N=80**	**100%**

All these figures from table-7 depict that the teaching faculty is ready to accept and implement technology for the ease of delivering and adopt new and modern ways to cope with the shift and makeover of education system in India.



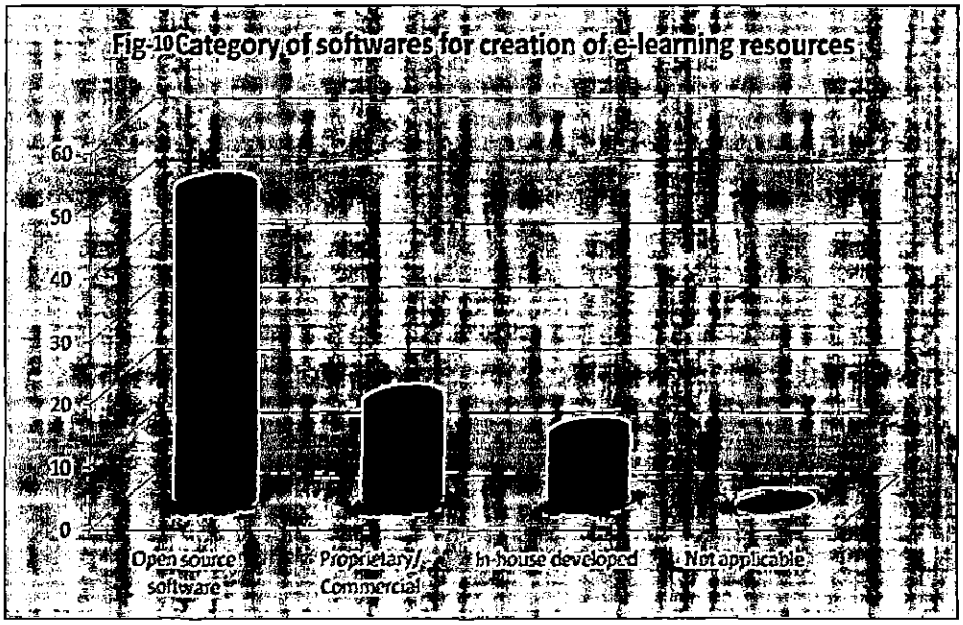
5.1.7 The category of softwares to create e-learning resources in LIS Education

Software plays an important role in structuring and scheming of an e-learning system. The whole infrastructure is dependent on the type of softwares handling the system. Various softwares are available in the e-learning market and many new open source softwares are coming up due to the rising global software demand and competition.

Table-8 Category of softwares for creation of e-learning resources

Software Category	No. of Responses	% age of the Response
Open source software	51	63.75%
Proprietary/ Commercial	17	21.25%
In-house developed	12	15.00%
Not applicable	0	0.00%
Total	**N=80**	**100%**

While suggesting the softwares for creation of e-learning resources in LIS education, most of the faculty members mentioned that open source (63.75%) and proprietary softwares (21.25%) are good options to be considered and only 15% responded that in-house developed softwares are more efficient. This depicts the mounting influence of open source softwares and their impact in growing e-learning market (Table-8).



5.1.8 Infrastructure providing the most versatile solution for delivering online learning

In relation with the type of infrastructure considered necessary for online instruction delivering, 63 (78.75%) faculty members believe that web-site based infrastructure will prove adaptable and viable enough for content delivering, while as 17 (21.25%) consider portal based system will be versatile to deliver online learning.

Table-9 Infrastructure delivering online learning

Infra-structure	No. of Responses	% age of the Response
Web-site based	63	78.75%
Portal based	17	21.25%
E-mail based	0	0.00%
Dial-up based	0	0.00%
Total	**N=80**	**100%**

The reason for the agreement with website-based solution is because of the fact that the instructors are used to surf through web sites more easily without snag than any portal, e-mail system or dial-up based system. But, with the increasing trend of designing portal-based systems, which are considered to be more secure and stable, the shift over is likely to be seen within few years (Table-9).

5.1.9 Infrastructure design offering the most versatile learning delivery system

Students expect more and something new from a delivering system and any fault or lacking can instill disappointment and lack of interest among them. Regarding the infrastructure design, 7 (8.75%) faculty members responded that proprietary in-house hosting could prove more effective, while as 73 (91.25%) find video-conferencing the best solution for learning delivery system.

Table-10 Infrastructure design for learning delivery system

Infra-structure Design	No. of Responses	% age of the Response
Proprietary in-house hosting	7	8.75%
CD-ROM distribution	0	0.00%
Video-Conferencing	73	91.25%
Third party hosting	0	0.00%
Total	**N=80**	**100%**

The above table-10 clearly depicts that face-to-face instruction is the most preferred type of infrastructure design which is most effective as compared to the other infrastructure designs which do not provide any face-to-face interaction interface.

5.1.10 Technique to be used for developing e-learning modules

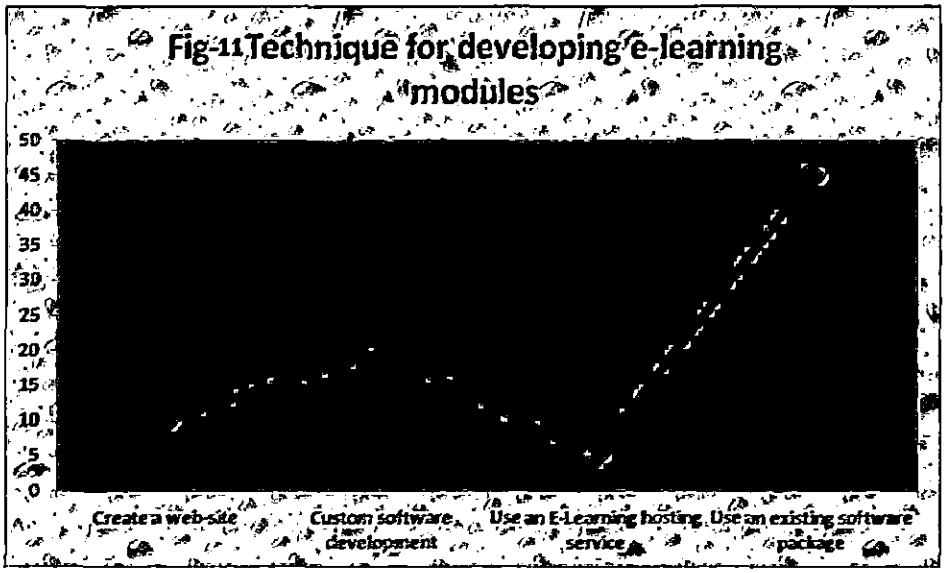
Developing e-learning modules require unassailable Content Management Systems or Learning Content Management Systems which can draft overall interface of an e-learning system. In response to this question, 45 (56.25%) of the faculty members responded that the use of an existing software package is viable, while as 20 (25%) find that custom software development will prove better. 10 (12.5%) responded that a web-site based system should be created and only 5 (6.25%) respondents have opinion of using e-learning hosting service.

Table-11 Technique for developing e-learning modules

Technique	No. of Responses	% age of the Response
Create a web-site	10	12.5%
Custom software development	20	25%

E-Learning hosting service	5	6.25%
Existing software package	45	56.25%
Total	**N=80**	**100%**

The use of existing software like Moodle, Joomla etc. within an organization is well supported because of the fact that the staff is well trained in the same and shift over to other software will take a lot of time to expertise and whole of the content is to be shifted from one system to another which can affect the overall delivering of an e-learning system (Table-11).



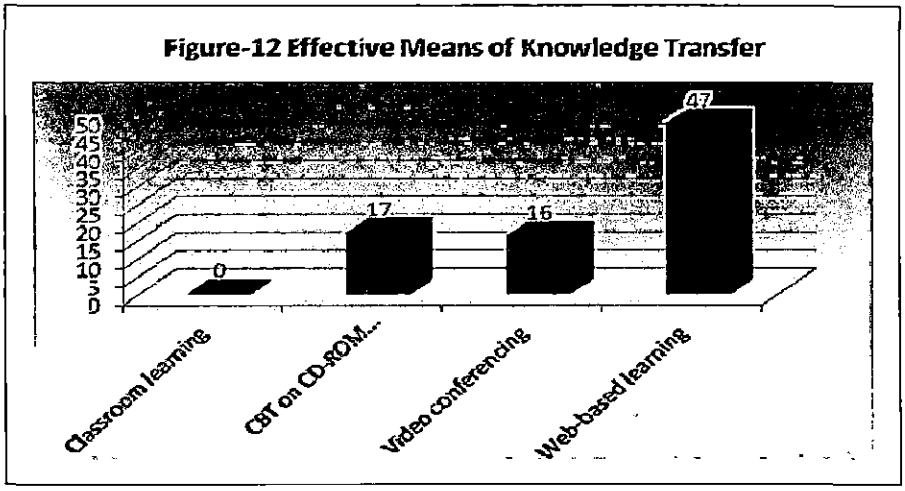
5.1.11 Most effective means of knowledge transfer in electronic environment

It is established from table-12 that most of the faculty members (58.75%) find web-based learning the most effective means of knowledge transfer in electronic environment. The advantage of the availability of various resources in web-based environment makes it easier to deliver contents and to refer to various resources within no time and students can have access to huge number of resources for which the links or banners can be provided.

Table-12 Effective means of knowledge transfer in electronic environment

Means	No. of Responses	% age of the Response
Classroom learning	0	0.00%
CBT on CD-ROM	17	21.25%
Video conferencing	16	20.00%

Web-based learning	47	58.75%
Total	**N=80**	**100%**



5.1.12 Most critical component of web-based E-learning delivery system

The critical components viz. security, accessibility, availability etc. are considered as the most important features in any e-learning delivery system.

Table-13 Critical component of web-based delivering system

Components	No. of Responses	% age of the Response
Security	62	77.50%
Availability	51	63.75%
Scalability	43	53.75%
Accessibility	59	73.75%
Cost	37	46.25%

(*Multiple selections permitted)

In the twenty first century, the problems of hacking the system are prevailing and in order to avoid any such incident with the system, stress is given on the security and control of that system. Once the system is fully operational, it should also be capable of being accessed from anywhere with ease. Lack of availability of resources and content can result in discontentment with the system and thus result in its failure (Table-13).

5.1.13 Different ways effective in communicating with students in online courses

Communication between the teacher and students plays a pivotal role for effective knowledge transfer. The modes of communication depend on the

capability of the system to handle such means and vary from system to system, depending on the efficiency of handling multi-dimensional approaches of communication.

Table-14 Modes of communication with students in online courses

Communication Modes	No. of Responses	% age of the Response
E-mails	73	91.25%
Study guides	48	60.00%
Social networking	53	66.25%
Phone calls	16	20.00%
Audio/Video conferencing	71	88.75%

(Multiple selections permitted)

It is revealed from table-14 that emails (91.25%), audio/video conferencing (88.75%) and social interaction through networking sites (66.25%) are considered as the most preferred ways to teach in an online instruction. This allows students to get in touch with the teachers anytime and anywhere at their ease, thus enhancing the teacher-student relationship for mutual understanding. It is also seen that the phone calls are made only in case of any complaint, intimation or an important announcement regarding the course.

5.1.14 Strategies effective in assessing what students are learning from online instruction

Assessments play a major formative role in driving students learning appropriately. Assessments performed at crucial times in the learning process can spell the difference between gathering data to evaluate students and using assessments to enhance learning. Incorporating assessments into the training programs help to determine areas of proficiency and deficiency at the individual and group level and determine training direction and track results.

Table-15 Strategies for the assessment of students

Strategies	No. of Responses	% age of the Response
Essays	23	28.75%
Projects	63	78.75%
Multiple-choice tests	72	90.00%

Assignments	30	37.50%
Tracking and seeing how they respond to your feedback	42	52.50%

(Multiple selections permitted)

The above table-15 depicts that 90% and 78% of the faculty members believe that multiple-choice tests and projects respectively are the best strategies for the assessment of students on online courses. Drafting multiple-choice tests and assigning projects are the best ways to formative, summative, evaluative and educative assessments from providing diagnostic feedback to students and instructors; description of students' level attainment, curricular feedback to building students (and faculty) insight and understandings about their own learning and teaching.

5.1.15 Techniques to keep students motivated throughout the course

Motivation of students in online courses is a challenging task. It is difficult to keep students motivated throughout the course because of the varying requirements of students, the type of students and their study habits that vary from student to student. There must always be something new and innovative so as to maintain student's interest in the course.

Table-16 Techniques for keeping students motivated throughout the course

Techniques	No. of Responses	% age of the Response
Listen more and stay tuned into the course	36	45.00%
Allow opportunity to redo an assignment to meet expectations	57	71.25%
Providing time and opportunity to review	41	51.25%
To keep a time-line to chat their progress	59	73.75%
Immediate responses and feedback	47	58.75%

(Multiple selections permitted)

The data from table-16 indicates that a timeline to check the progress (73.75%) and opportunities to redo an assignment (71.25%) must be devised in order to keep students motivated throughout the course.

5.1.16 Do you agree that internet is reliable enough to provide 24x7 delivery of learning?

Internet is the most important means of delivering electronic learning in a digital and networked environment. Students have access to multimedia learning resources including case studies, revision materials, assessments, and peer discussions - all through the internet.

Table-17 Reliability of internet for 24x7 learning

Level of Agreement	No. of Responses	% age of the Response
Strongly Agree	46	57.50%
Agree	33	41.25%
Neutral	0	0.00%
Disagree	1	1.25%
Strongly Disagree	0	0.00%
Total	**N=80**	**100%**

The above table-17 clearly depicts that 98.75% of the faculty members (strongly agree+agree) finds internet as the most reliable means of providing 24x7 learning. It is mostly because of the fact that on internet, students as well as teachers can access millions of resources within no time and can save the time in searching for the printed documents lying in the libraries, wherever possible.

5.1.17 Do you agree that application of e-learning system would replace or substitute the traditional classroom teaching?

From centuries, traditional face-to-face learning is considered as the best teaching method and has prevailed till date with the demand and the number of students ever increasing. But e-learning is nowadays considered as the alternative to the traditional classroom learning because of the benefits which it promises to offer. With the advent of latest innovative technologies for classroom teaching and learning because of ICT, e-learning is gaining more importance.

Table-18 E-learning as a substitute for traditional learning		
Options	**No. of Responses**	**% age of the Response**
Yes	0	0.00%
No	67	83.75%
Can't say	13	16.25%
Total	**N=80**	**100%**

The table-18 above reveals the fact that none of the faculty members believe that e-learning cannot replace traditional classroom learning in the near future. The reason behind this is that majority of the people are not well aware about the e-learning technology. Most of the students fail to purchase high cost digital equipments and in the developing countries, it is like a dream for poor to possess any such tools. There is a poor internet connectivity in developing countries which is a great set back to e-learning.

The social interaction, practical learning skills development, interactive classroom settings, encouragement, exchange of ideas without communication barriers are missing in e-learning and can only be achieved in traditional learning.

5.1.18 Do you think third party providers or outsourcers are a safe and reliable means of providing learning?

The third party service providers of learning are not always considered as best and safe because of various disadvantages associated with them. The table-19 below illustrates that even if most of the faculty members were not sure about third party outsourcing but still they felt that it is not the best way to provide learning.

Table-19 Third party service providers for outsourcing		
Options	**No. of Responses**	**% age of the Response**
Yes	0	0.00%
No	14	17.50%
Can't Say	66	82.50%
Total	**N=80**	**100%**

The main reasons for not showing trust in outsourcing is because of the irregularities on part of third party outsourcers. They have their own defined

requirements and deliverables with no long term commitment. This can waste time and money and the quality of learning can be affected.

5.1.19 Do you believe that properly implemented Human Computer Interface (HCI) is important to a favourable user experience?

The goal of HCI is to solve real problems in the design and use of technology, making computer-based systems easier to use and more effective for people and organizations. Ease of use and effectiveness are critical to the success of any systems that interact with people, including software systems, home, office and factory appliances, and web and phone applications. Designers always face problems in learning the user's tasks and domains which are always complex. Graphic designs, standards, technical writing, performance, social factors and legal issues make it more difficult to design favourable human computer interface.

Table-20 HCI for favourable user experience

Options	No. of Responses	% age of the Response
Yes	80	100.00%
No	0	0.00%
Can't Say	0	0.00%
Total	**N=80**	**100%**

In order to make e-learning effective and successful, the easy-to-use human computer interface plays a great role and little or no expertise is required in doing so as is depicted from the data shown in the table-20 above.

5.1.20 Features that must be present in an e-learning system

The main features in an e-learning system mainly consist of software related features, communication preferences, content and course related features which are correlated and dependent on each other for the overall success of the system. The list of the responses receive from the faculty members is listed as under, however, multiple selections are permitted to select various options and features to be present in an e-learning system.

Table-21 Features in an e-learning system

Features	No. of Responses	% age of the Response
User friendly Menus	68	85%
Communication Tools	34	42,5%
Additional Enrichment	21	26.25%
Message Boards	47	58.75%
Navigation Options	23	28.75%
Tools for posting media online	61	76.25%
Online chats/Social networking	13	16.25%
Ask a Teacher	52	65.00%
Tools for threaded discussions	16	20%
Detailed Syllabus	61	76.25%
Interactive learning activities	23	28.75%
Status reports of student's progress	13	16.25%
Study guidelines	42	52.50%
Downloadable Audio/Video lectures	73	91.25%
Course events and forums	63	78.75%
Feedback Options	75	93.75%

(Multiple selections permitted)

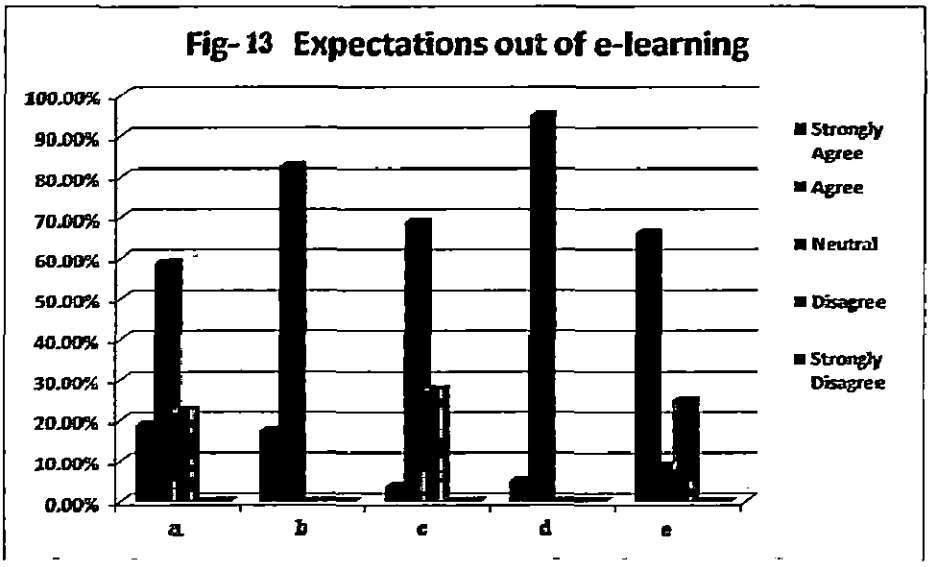
The table-21 above shows that the course and content related features matter the most for teachers because their ultimate aim is to provide learning with more effective and simple ways. The software and communication related features need to be investigated thoroughly by course developers and that is why the faculty members didn't stress more on those issues. User-friendly menus, feedback and downloadable audio/ video lectures are the most accented features that need to be present in an e-learning system.

5.1.21 Expectations about e-learning on the basis of five point Likert Scale formulated

1. E-learning can enhance the reach and quality of LIS education.
2. The use of e-learning creates better interaction between teacher and students.
3. The application of e-learning makes the course more interesting.
4. E-learning provides a better learning experience.
5. E-mail and other internet tools are very effective means of communication utilized for academic purpose.

Table-22 Expectations about e-learning					
Agreement/ Disagreement	**1**	**2**	**3**	**4**	**5**
Strongly Agree	18.75%	17.50%	3.75%	5%	66.25 %
Agree	58.75%	82.50%	68.75%	95%	8.75%
Neutral	22.50%	0%	27.50%	0%	25%
Disagree	0%	0%	0%	0%	0%
Strongly Disagree	0%	0%	0%	0%	0%

The agreement with the enhancement of the reach and quality of LIS-education by e-learning is 58.75% and 18.75% strongly agreed while 22.50% remained neutral in their statement. None of them disagreed with the prospect of enhancement because of e-learning. This clearly depicts that the electronic way of learning is capable of delivering what is expected from it (Table-22).



Use of e-learning creates better interaction between teacher and students holds firm as it is agreed by all faculty members and none of them disagrees with the statement. The fact is that students can stay in touch round the clock with teachers irrespective of the time and distance constraints.

Use of electronic gadgets and multimedia embedded systems in teaching and learning process makes it more interesting and lively. Out of the total responses received, 73% of the faculty members agree that the application of e-learning

using various interactive tools makes it more interesting and responsive and help to better understand the concepts with multiple examples and diagrams. While as 27.5% faculty members remained neutral in suitably answering the query. Ending the debate on the query whether e-learning provides a better learning experience or not, 100% of the faculty members agreed to this affirmation that e-learning provides a better experience in the usage and methods of electronic ways to learn and dispense teaching. The fact behind this is that students remain enthusiastic about the new methods and the use of electronic equipments and take it as something new to their practice.

Since, the internet has made the virtual learning reality possible for the next generation learners, the integrated learning paths that vary according to the student, the subject material and the level of competence with other students; thus seen as appealing, valuable and productive for their goals and aspirations. The internet tools and e-mails etc. proves to be very effective means of communication for this purpose and 75% of the faculty members agree such tools can be better utilized for academic purpose, while as 25% neither agree nor disagree to this assertion.

5.2 Part-2 E-learning Proficient Staff Members' and Student's Response

In order to select and study the universities, stratified sampling technique is chosen whose detailed description is given in the sampling techniques used in the Chapter-1. A total number of 64 questionnaires were distributed to the proficient staff of eight universities providing e-learning. Out of these, 52 members responded and all of the questionnaires were complete. A total of 480 questionnaires were distributed to students pursuing various online courses out of which, 418 were received back and were selected for the study. One of the questionnaires used for collection of data deals with the e-learning proficient staff and students from various universities which are currently providing e-learning in at least one of the disciplines. The study aims to analyze the design and developmental process of a working e-learning system along with its infrastructure requirements, efficiency, operational functioning, obstacles and

feedback about the system. The analysis of the response received is listed as under:

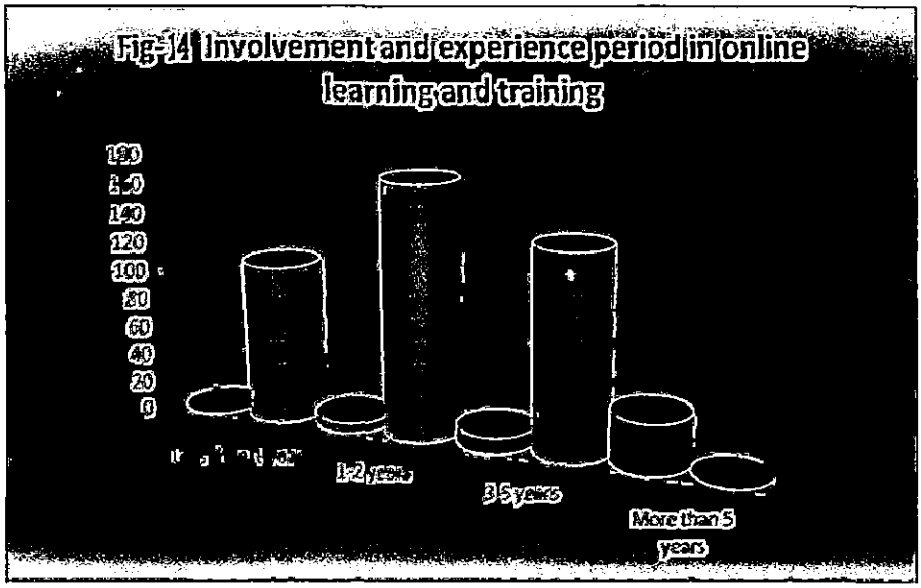
5.2.1 Involvement and experience period in online learning and training

Use of technology to facilitate learning is accepted to be of value across educational institutions. Government of India has formulated the National Mission on Education through Information and Communication Technology (NME-ICT) and is taking cognizance of the institutional support required for resources in online learning and training. Although e-learning reached late in the Indian education system but it is being accepted by most of the learning institutions and the overall experience with e-learning and training is gaining its ground with each passing day.

Table-23 Involvement and experience period in online learning and training

Category	Less than 1 year	1-2 years	3-5 years	More than 5 years
Proficient Staff	0 (0.0%)	7 (13.47%)	11 (21.15%)	34 (65.38%)
Students	109 (26.08%)	172 (41.15%)	137 (32.77%)	0 (0.0%)

The table-23 above clearly indicates that none of the students have more than 5 years experience in online learning and training. However, 65.38% of the proficient staff members have been involved in online learning and training for more than 5 years and 34.62% are not that much experienced in online learning and training. Only 32.77% of the students have got 3-5 years of experience and 41.15% of the students have got 1-2 years of experience which indicates that most of the students are new and have less involvement in online learning and training. This inexperience can delay the learning process for the students till they get completely acquainted with the new learning environment. In Asia, a great digital divide has been created by the latest digital and communication technologies. Most of the students do not afford the higher cost of the electronic and digital equipments essential for e-learning and the proper internet connectivity is limited to certain areas in a city. Most of the government institutions fail to suffice the modern learning needs of students.



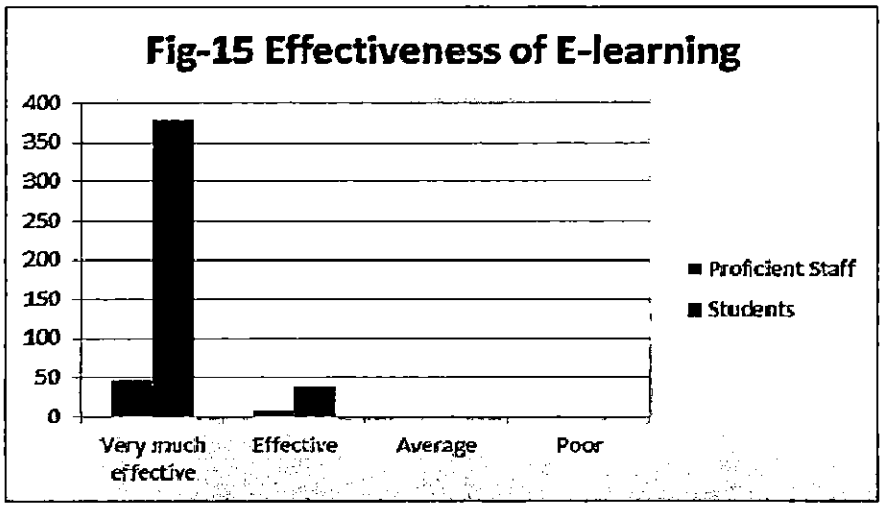
5.2.2 Effectiveness of e-learning in today's ICT era

In today's world, technology has its impact and influence on all aspects of higher education and western countries have embedded the technology within their learning environment. This has put pressure on all the developing countries to strive hard in order to compete at international level by embedding equally innovative technologies in their academic institutions.

Table-24 Effectiveness of e-learning in today's ICT era

Category	Very much effective	Effective	Average	Poor
Proficient Staff	45 (86.53%)	7 (13.47%)	0 (0.0%)	0 (0.0%)
Students	380 (90.91%)	38 (9.09%)	0 (0.0%)	0 (0.0%)

The table-24 above clearly demonstrates that 86.53% of the proficient staff and 90.91% of the students are of the opinion that e-learning can prove very much effective in improving the performance of learning and education system in India. None of the proficient staff member and student has responded average or poor remarks for the effectiveness of e-learning in today's ICT era. This clearly depicts that there is a definite hope of the positive influence and aspect of e-learning in modern digital era.



5.2.3 Success of e-learning in the organizations to improve their learning and outreach

In an increasingly competitive market, the universities are keenly aware of the need to remain at the forefront. The success of the organization is measured in terms of the number of students, courses offered, page hits, infrastructure, quality and depth of the teaching and the total results as research output. In order to enhance the excellence, e-learning has opened new facets and dimensions in the innovation for flexible learning, connecting education with other aspects of life and work.

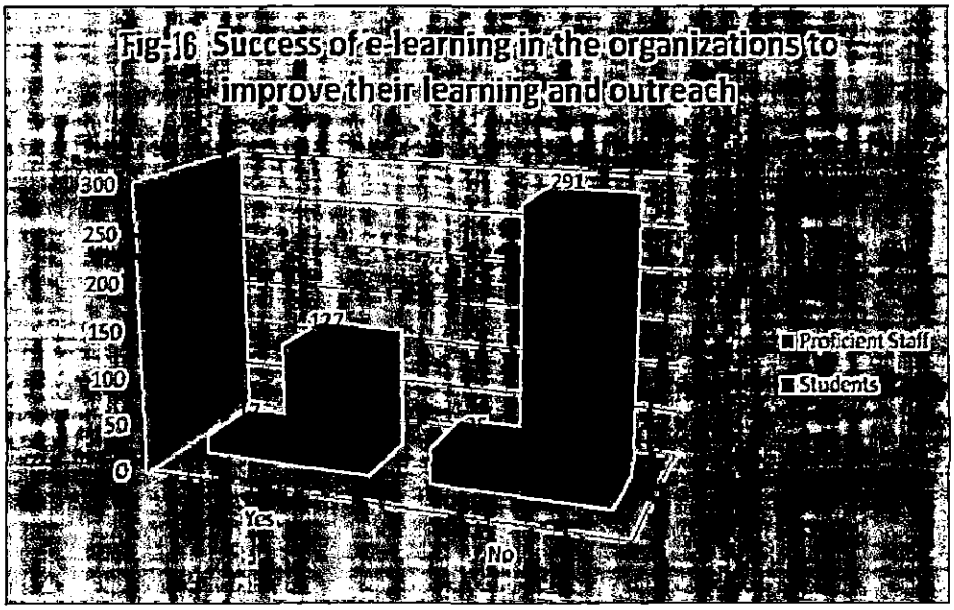
In Indian universities, e-learning is still at the periphery and none of the organizations is completely dependent on e-learning for its success. Indira Gandhi National Open University (IGNOU) is the only Open University in India, which has started many online courses in various subject fields and e-learning is considered as essential for its success.

Table-25 Success of e-learning in the organizations to improve their learning and outreach

Category	Yes	No
Proficient Staff	17 (32.69%)	35 (62.31%)
Students	127 (30.3%)	291 (69.7%)

The table-25 above clearly depicts that 69.7% of the students and 62.31% of the proficient staff members believe that e-learning has only been included as a

holdup, not as an alternative or substitute to traditional learning in their organization.



Since, none of the institute in India is entirely delivering online education, but the trend is changing and e-learning is not going to remain merely at periphery. It will proliferate and extend its impact on the purely online delivery of learning.

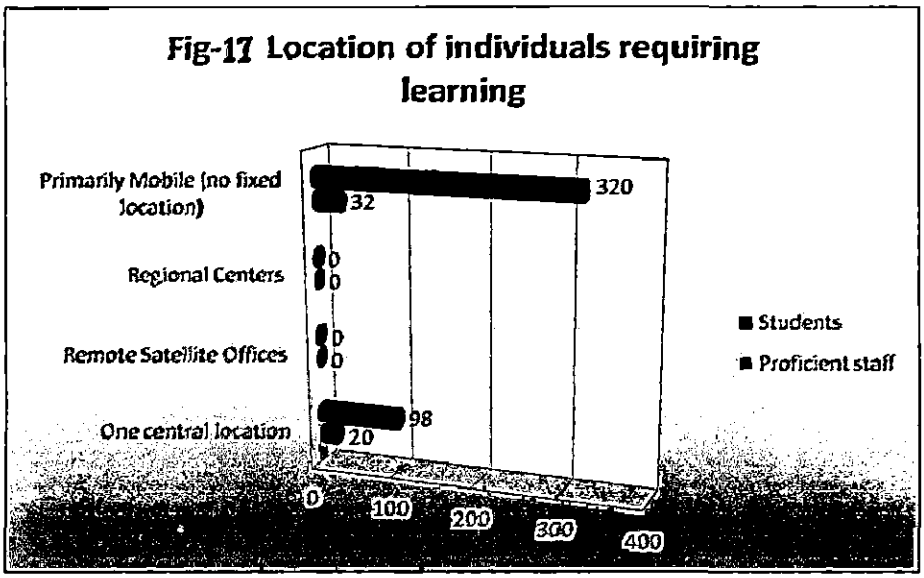
5.2.4 Location of individuals requiring learning

The location of the learners in electronic environment is usually diverse in many geographical places, but for some of the institutions, it is central. The table below exemplifies the nature of diverse location except for the University of Kashmir, where it is central in the department of EMMRC which uses overhead projectors and video-conferencing mode of learning and teaching.

Table-26 Location of Individuals required learning

Category	One central location	Remote Satellite Offices	Regional Centers	Primarily Mobile (no fixed location)
Proficient staff	20 (38.46%)	0	0	32 (61.54%)
Students	98 (23.44%)	0	0	320 (76.56%)

The data depicts that there is a considerable difference between the location of individuals requiring learning and the delivery of online instruction. Both of them are independent of each other and students rather prefer to be mobile than to stick at some central location (Table-26).



5.2.5 Mode of delivering learning in an organization

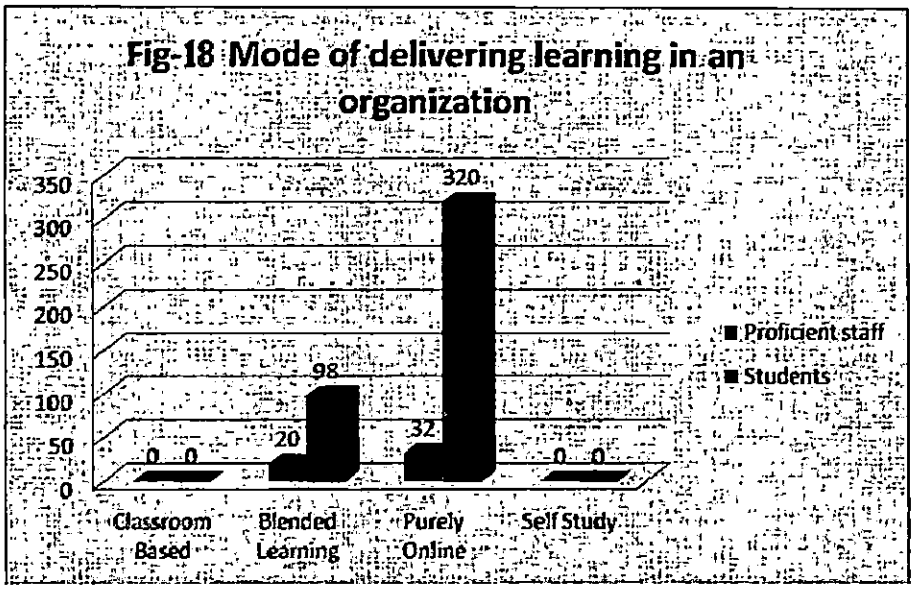
E-learning comes in many variations and often a combination of purely online - no face-to-face meetings, Blended Learning - combination of online and face-to-face, Synchronous/Asynchronous, Instructor-led group, Self-study, Self-study with subject matter expert, Web-based, Computer-based (CD-ROM) and Video/audio tape.

Table-27 Mode of delivering e-learning

Category	Classroom Based (Using CD-ROMs)	Blended Learning	Purely Online	Self Study
Proficient staff	0	20 (38.46%)	32 (61.54%)	0
Students	0	98 (23.44%)	320 (76.56%)	0

The data from the table-27 reveals that there is a sizeable difference between the blended learning and the purely online learning. Blended learning is

considered as one of the best method of teaching and learning as it is the combination of various electronic and traditional classroom delivery methods but is not practiced in most of the select universities. The reason for this is the distribution of learners which is primarily diverse and mobile.



5.2.6 Frequency of learning carried out in the organization

The frequency of e-learning depends on the organisational policies and the mode of learning. Some of the institutions provide it on regular basis, while for some; it is just an additional support and distance learning method where the whole course content is available for download.

Table-28 Frequency of learning performed in an organization

Category	Quarterly	Monthly	Weekly	Daily Basis
Proficient staff	0 (0.0%)	0 (0.0%)	11 (21.15%)	41 (78.85%)
Students	0 (0.0%)	0 (0.0%)	147 (35.17%)	271 (64.83%)

The table-28 above illustrates that most of the institutions provide e-learning on regular basis and more frequently. This is a good indication for e-learning success as the full time courses require frequent teaching and learning and can enhance institution's competence in ICT environment.

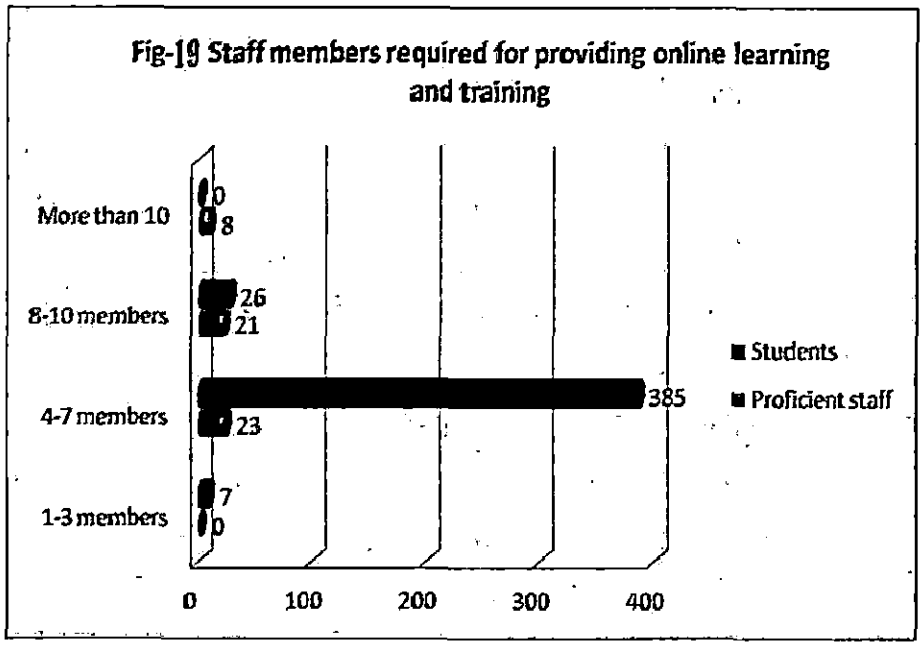
5.2.7 The number of staff members that are required for providing effective online learning and training

To carry out smoothly and efficiently the functions and delivering of online instructions, the employment of technical experts and deployment of staff members is an obligation.

Table-29 Staff members required for providing online learning and training

Category	1-3 members	4-7 members	8-10 members	More than 10
Proficient staff	0	23 (44.23%)	21 (40.39%)	8 (15.38%)
Students	7 (1.67%)	385 (92.11%)	26 (6.22%)	0

Out of the 52 proficient staff members, 23 (44.23%) responded that 4-7 staff members and experts are required in their departments for providing e-learning. While as 21 (40.39%) of the proficient staff members responded that they require 8-10 staff members and experts for providing e-learning to the large number of users in various courses they offer. Eight proficient staff members responded that they require more than 10 staff members and experts to carry out their e-learning delivering process (Table-29).



5.2.8 Expertise of proficient staff members

A number of activities are associated with the e-learning delivery system such as content development, design and development, learning objects development, updating, security, communication tools management etc. which requires expert personnel to look after.

Table-30 Expertise of proficient staff members

Category	Subject experts	Computer experts	Technical experts	E-learning experts from outside the organization	All of the above
Proficient Staff	23 (44.23%)	11 (21.16%)	5 (9.61%)	1 (1.92%)	12 (23.08%)
Students	185 (44.26%)	110 (26.31%)	78 (18.67%)	6 (1.43%)	39 (9.33%)

The table-30 above shows that 44.23% of e-learning proficient staff mostly believes that the staff members must include subject experts and 21.15% as computer experts. Students are almost of the same opinion which proves that subject experts and computer experts in e-learning play a very important role and are an essential workforce in any organization which handles and subdue the whole of the expert e-learning system. Computer experts are many a times technical experts also and the consultant experts are very few which provide their expertise as and when required by the organization.

5.2.9 Different ways effective in communicating with students in online courses

The guided didactic communication is the propeller spring of all the process of learning of long-distance students responsible for the development of the autonomy. Therefore, the communication must all be present during the course on a personalized form (for the student to feel motivated). This communication has three main purposes:

1. To support the interest and motivation of the students.
2. To facilitate, support, and to guide the learning of the students knowing that this can apply the explanations, knowledge and suggestions.
3. To follow and analyze the progress of the students and feedback the process.

Table-31 Ways effective in communicating with students in online courses

Category	E-mail	Comments	Social Networking	Phone Calls	Feedback
Proficient staff	36 (69.23%)	21 (40.38%)	14 (26.92%)	29 (55.77%)	32 (61.53%)
Students	407 (97.36%)	42 (10.05%)	327 (78.22%)	285 (68.18%)	387 (92.58%)

(Multiple answers are permitted)

The table-31 above shows that e-mail (69.23% by proficient staff and 97.36% by students) is so far considered as the best and effective ways of communication with students in online environment, followed by tracking changes on feedback (61.53% by proficient staff and 92.58% by students) and allowing phone calls to the students (55.77% by proficient staff and 68.18% by students) to promote the pleasure in the study and the motivation of the student. Social networking is controversial with most of the proficient staff members denying that it must not be allowed in an educational environment but is an essential component in disguise in virtual learning environment.

5.2.10 Focus of learning feedback

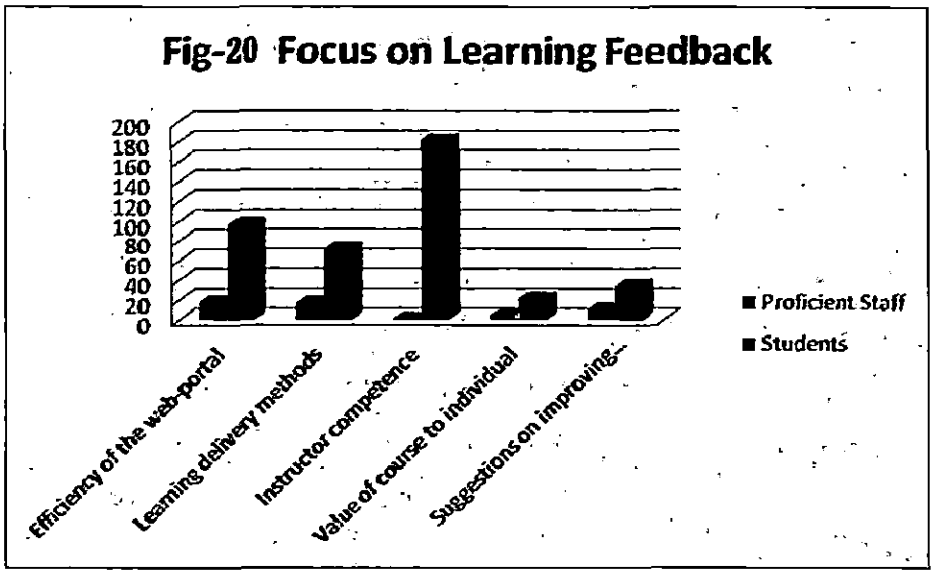
E-learning being a self-directed environment needs to continuously keep students and learners motivated throughout the course. For the purpose, feedback acts as a strong instrument for improving services and keeps students motivated.

Table-32 Focus of learning feedback

Response	Efficiency of the web-portal	Learning delivery methods	Instructor competence	Value of course to individual	Suggestions on improving learning
Proficient Staff	18 (34.61%)	17 (32.69%)	1(1.92%)	5 (9.62%)	11 (21.16%)
Students	97 (23.2%)	72 (17.22%)	182 (43.54%)	22 (5.26%)	35 (8.37%)

As per the data from table-32 provided above, the information disclosed from the feedback must mainly focus on the efficiency and improvement of e-learning web portal and use of various delivery methods (60.71%) which students often find difficult because of the complexities in software used as a

delivery system. 21.16% of the feedback consists of the suggestions to improve learning and 1.92% to improve instructor's competence. The data reveals that students mainly prefer the instructors to be competitive enough that can help them to improve their ease of learning within their range of capabilities.



5.2.11 Effective strategies of assessing the learning from online instruction

Information and communication today offers numerous ways of to enrich educational assessment both in large scale testing situations and in the classroom. With dynamic user interactivity, visuals and sound, real time score reporting, computer based assessments immensely enhances testing possibilities beyond the limitations of traditional paper and pencil tests. Technology should be balanced to take advantage of this new frontier for innovation in assessment, bringing forth new assessment tasks and potentially powerful scoring, real time feedback mechanism and reporting for use by teachers and students.

Table-33 Effective strategies of assessing the learning from online instruction

Category	Essays & Projects	Short Answers	Multiple-Choice Tests	Assignments & Activities
Proficient staff	4 (7.7%)	14 (26.92%)	27 (51.92%)	7 (13.46%)
Students	18 (4.30%)	84 (20.09%)	287 (68.66%)	29 (6.94%)

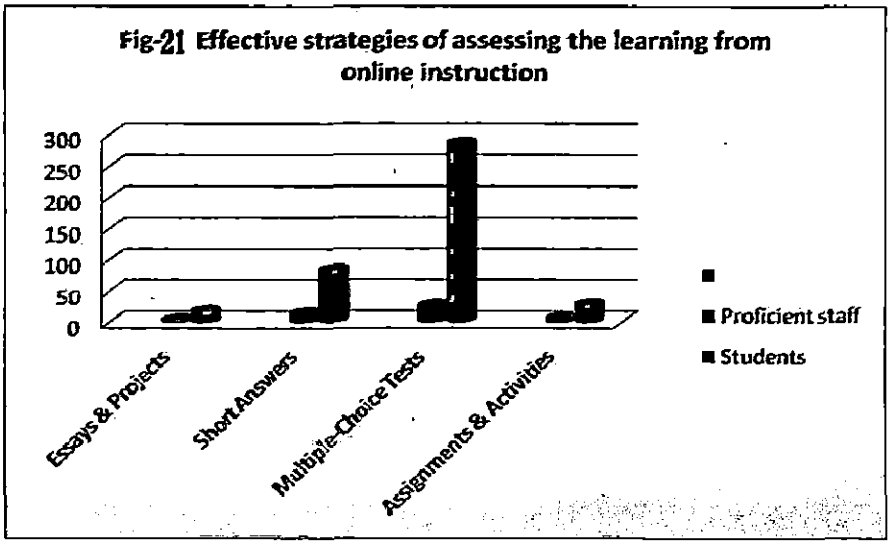
The data presented in the table-33 shows that the assessment through multiple choice tests is done in every e-learning system. It is considered as the most effective way of assessment as it is readily scorable by a variety of electronic means and offers some striking features as an assessment format.

According to some of the researchers, multiple choice tests encourage poor attitude towards learning and to overcome that problem, multiple choice tests are accompanied by short answer type assessments and 26.92% of the proficient staff members believe that incorrect influence of multiple choice tests is minimized in this way.

Assignments and homework is another way of assessing in electronic web-based learning. Students are assigned some home tasks and assignments to be completed in due course of time and by this way, 13.46% of the proficient staff believes that they are made self dependent and their skills are improved.

Online activities may include some type of project completion, and evaluation which enhances the searching and browsing techniques and help to reach a huge number of online resources available. By this way, student's dependence on the content and textual material from teachers is lowered and their vision of understanding learning objects is amplified by the huge number of resources available on just any of the single concepts. 13.46% of the proficient staff members hand over assignments and home task to students.

Long essay type assessments are usually avoided in web-based learning as it can disinterest the students who are not good at typing. However, tracking and seeing how students respond to essays and projects is a good method adopted by 7.7% of the proficient staff members to check how students learn in electronic environment without actually communicating with the students. This way, many loopholes can be corrected and the system efficiency can be enhanced.



5.2.12 Content delivery speed of e-learning to meet the requirements

Today, when change is faster than ever, a key advantage of e-learning is that it has faster delivery times than traditional classroom based instruction. Rapid prototyping or rapid e-learning using various authoring tools is one approach to the development of learning content that has experienced exponential growth.

Table-34 Content delivery speed of e-learning

Category	Satisfied	Dissatisfied	Tabulated Value at 5% for df =1	Chi-Square (X^2)
Proficient Staff	36 (69.23%)	16 (30.77%)	3.841	57
Students	86 (20.57%)	332 (79.43%)		

The data reveals that 69.23% of the proficient staff members and 20.57% of students are satisfied with the delivering speed of their online instruction. However, 30.77% of the proficient staff members and 79.43% of students seems to be dissatisfied because of the lack of proper infrastructure for learning content delivery and real-time video-conferencing system. This time lag in developing and delivering learning has resulted in poor learner's response and satisfaction and thus in turn affected their performance (Table-34).

On applying the Chi-Square test, it is found that the calculated Chi-Square value (57) is higher than the Chi-Square tabulated value (3.841) with 1 degree

of freedom at 5% level of significance. The Chi-Square test, therefore, reveals that there is a significant difference among proficient staff and students with regard to the content delivery speed in online delivery of education.

5.2.13 The application of e-learning would replace or substitute the traditional classroom teaching

E-learning is rapidly growing at a very fast pace and today; most of the institutions are shifting from traditional delivery mechanism to online learning. However, the question arises 'would e-learning replace or substitute the traditional classroom teaching?' None of the proficient staff members agree with this because of the numerous reasons that e-learning fails to deliver in social context.

Table-35 Application of e-learning to the traditional classroom teaching

Category	Yes	No	Can't Say
Proficient Staff	0 (0.0%)	47 (90.38%)	5 (9.62%)
Students	72 (17.22%)	346 (82.78%)	0 (0.0%)

The table-35 above reveals that 90.38% of the proficient staff and 82.78% students are of the opinion that e-learning cannot replace or substitute traditional classroom based teaching. Nevertheless, they are of the opinion that the blended learning, a combination of both electronic and classroom learning, is the most beneficial, time and cost effective and retains face-to-face element making it essentially the best of both worlds.

5.2.14 The application of e-learning system would cause to weaken the student faculty relationship

The interpersonal relationship between students and teacher is an important element contributing to the learning process of students. In e-learning, we can find only mentorship which is a one-on-one learning relationship between a student and an expert in a specific topic or discipline for the purpose of supporting learning and development. Students and mentors can suitably and more frequently communicate with each other through words, pictures, and other information regardless of location or schedules. Besides the benefits,

there are various drawbacks like the weakening of student's performance with low teacher discourse, the practical sense of feelings and expressions during face-to-face instruction and dealing with the problems and differences of the individual students.

Table-36 Application of e-learning in weakening of student faculty relationship

Category	Yes	No	Can't Say	Tabulated Value at 5% for df =2	Chi-Square (X^2)
Proficient Staff	8 (15.39%)	33 (63.46%)	11 (21.15%)	5.991	13.6
Students	324 (77.51%)	67 (16.03%)	27 (6.46%)		

The data from the table-36 above shows that 63.46% of the proficient staff members and 77.51% of the students agree that e-learning or non-face-to-face environment weakens the student-teacher relationship. However, 15.39% of the proficient staff members and 16.03% of the students says it won't while 21.15% remained undecided about the students-teacher relationship in an online environment.

5.2.15 Reasons for working or failure of E-learning

E-learning is often cited as a form of learning that is taking over from the traditional forms of learning. E-learning is potentially a great medium that can provide a lasting and powerful change in terms of learning but it does not always work in an organizational setup.

Table-37 Reasons of working or failure of e-learning

Category	Material/ Content is complex	Hands on practice is required	Lack of infrastructure and expertise	Lack of face-to-face interaction	Complex user-interface and learning system	Tabulated Value at 5% for df =4	Chi-Square (X^2)
Proficient staff	6 (11.53%)	28 (53.85%)	4 (7.69%)	9 (17.30%)	5 (9.61%)	9.488	12.8
Students	107 (25.6%)	162 (38.75%)	26 (6.22%)	37 (8.85%)	86 (20.57%)		

The reasons why e-learning would not work in some cases is evident from the above table-37 that 53.85% of the proficient staff members and 38.75% students believe that the practical aspect of teaching and learning (hands on practice) is lacking in online mode of instruction and 17.30% staff and 8.85% students believe that the lack of face-to-face interaction is one of the problems. While 11.53% of the proficient staff members and 25.6% of the students says that the material is complex enough to understand and learn which in turn affects the students who are not quick to understand and are weak in structural setup of content.

Besides the above stated complexities, various problems associated with e-learning is the design by technologists which is often very complex and requires strong input from pedagogues in terms of content and learning process flow. The second main thing is that the learning is not build on the prior knowledge of learner and it can be the waste of time. The third thing is that an LMS/LCMS platform needs to be robust and stable at all times and any weaknesses in it can cause trouble and poor motivation among learners. Last but not the least; poor learner support can result in poor attendance to the programs as they are left to their own devices which can result in lack of interest.

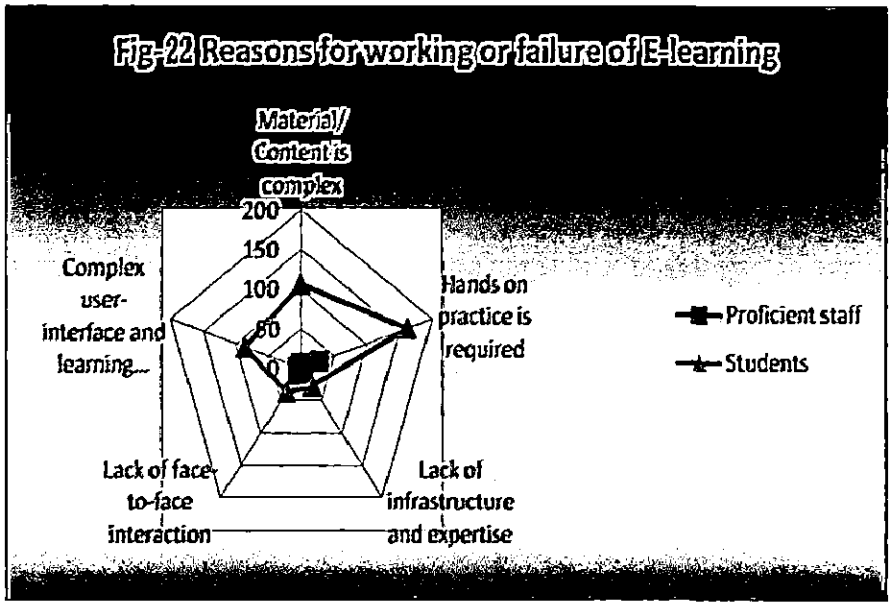


Fig-22 Reasons for working or failure of E-learning

5.2.16 Problems faced in the application and use of e-learning resources

E-learning resources mostly includes asynchronous, web-based instructional content in the form of html tutorials, online databases, institutional repositories, interactive video, flash animations, screen captured presentations, and the like. The use of these resources depends mostly on the internet accessibility and the digital equipments available in the organization.

Table-38 Problems faced in the application and use of e-learning resources

Category	Yes	No
Proficient Staff	19 (36.54%)	33 (63.46%)
Students	292 (69.86%)	126 (30.14%)
If Yes, Please Specify	Slow and poor internet connectivity and inadequate infrastructure facilities	

The table-38 above depicts that a total of 19 (36.54%) proficient staff members and 292(69.86%) of the students associate the problems either with the poor internet connectivity or inadequate infrastructure facilities in their organizations. This could be mainly because of the lack of proper financial assistance which plays a major role in building up the infrastructure and adding resources to the learning instructional system. While as 63.46% of the proficient staff members and 30.14% of students did not face any problems in applying e-learning resources in their departments.

5.2.17 Use of e-learning resources

The table-39 below shows that 40.39% of the proficient staff uses e-learning resources to innovate in teaching and learning, in order to make it more simple and easy to use. While as 32.69% of the proficient staff and 32.77% of students believe that it can expand the scope of LIS education and 19.23% use it to improve the quality of traditional education. Out of the total proficient staff members, only 7.69% believe that it can improve the quality of teacher-student interaction in electronic environment.

Table-39 Ranking of the reasons for using e-learning resources

Category	Improve quality of traditional education	Improve quality of teacher-student interaction	Expand the scope of subject education	Innovate in teaching and learning	Tabulated Value at 5% for df =3	Chi-Square (X^2)
Proficient staff	10 (19.23%)	4 (7.69%)	17 (32.69%)	21 (40.39%)	7.815	3.83
Students	87 (20.81%)	68 (16.27%)	137 (32.77%)	126 (30.14%)		

In today's world, where there is expansion of territories beyond boundaries in commerce, economics, politics, education is no longer an exception. E-learning has opened the ways to innovate in teaching and learning and can help in expanding the scope of subject education both at National and International level.

5.2.18 Obstacles in using e-learning resources in teaching and learning process

Professional development plays an important role in practicing learning and teaching process in electronic environment. Lack of lack of training programmes for sufficient expertise is considered as one of the major obstacles by 51.92% of the proficient staff in employing e-learning resources in their departments followed by inadequate infrastructure (34.61%).

Table-40 Obstacles in using e-learning resources in teaching and learning process

Category	Insufficient ICT know-how	Inadequate infrastructure	Lack of Expertise	Lack of Time	Tabulated Value at 5% for df =3	Chi-Square (X^2)
Proficient staff	2 (3.84%)	18 (34.61%)	27 (51.92%)	5 (9.61%)	7.815	48.3
Students	62 (14.83%)	224 (53.58%)	107 (25.60%)	25 (5.98%)		

Insufficient ICT knowledge is also a matter to ponder over as 25.60% of the students believe that it is one of the impediments which hinder the smooth and effective progression of communication with staff in an e-learning system. 53.58% of the students believe that there is lack of sufficient infrastructure and

is a predicament to be stamped out in order to provide a better learning and knowledge in the fast growing modern world (Table-40).

On applying the Chi-Square test, it is found that the calculated Chi-Square value (48.3) is fairly large than the Chi-Square tabulated value (7.815) with 3 degrees of freedom at 5% level of significance. The Chi-Square test, therefore, reveals that there is a significant difference among faculty members and students with regard to the inadequate infrastructure and lack of expertise which act as obstacles in teaching and learning process.

5.2.19 Features in the existing e-learning system

The features of the e-learning system can be headed under the four main sections; viz. design, communication, content and course.

Table-41 Features existing in the existing e-learning system

Features	Proficient Staff (N=52)	Students (N=418)
User friendly Menus	46 (88.46%)	413 (98.80%)
Communication tools	44 (84.61%)	407 (97.36)
Additional enrichment	21(40.38%)	286 (68.42%)
Message boards	7 (13.46%)	72 (17.22%)
Navigation options	8 (15.38%)	136 (32.53%)
Tools for posting media online	17 (32.69%)	232 (55.50%)
Online chats/ Social Networking	12 (23.07%)	372 (88.99%)
Ask a teacher	49 (94.23%)	418 (100%)
Tools for threaded discussions	27 (51.92%)	389 (93.06%)
Detailed syllabus	45 (86.53%)	418 (100%)
Interactive learning activities	26 (50%)	357 (85.40%)
Status reports of student's progress	7 (13.46%)	42 (10.04%)
Study guidelines	21 (40.38%)	273 (65.31%)
Calendar of events	48 (92.37%)	405 (96.88%)
Downloadable audio/video lectures	52 (100%)	418 (100%)
Course events and forums	45 (86.53%)	392 (93.77%)
Subject faculty info in India	39 (75%)	344 (82.29%)
Feedback options	42 (80.76%)	323 (77.27%)
Any other item, please specify	Nil	

(Multiple answers are permitted)

The data from the above table-41 indicates that the features like ask a teacher, downloadable audio/video lectures and feedback options are available in all the

e-learning systems of select universities. Providing detailed syllabus (89.28%), user friendly menus (82.14%), better communication tools (75%), threaded discussions (67.85%) and interactive activities (60.71%) are some of the main features which ensures motivation among students and success of the overall learning instruction. Social networking features are absent in most of the e-learning systems and there is a complete disagreement in displaying the status reports of student's progress in a forum or message boards.

5.2.20 Features to be included in your existing e-learning system

The features present in the existing e-learning system are sometimes not enough to provide a better learning experience. There are many other perspectives of staff and students that need to be incorporated in the existing e-learning system.

Table- 42 Features to be included in the existing e-learning system

Category	News & Events	Users Count	Standards Compliance	References	Graphics	Site Search	Web 2.0 Items
Proficient Staff	17 (32.69%)	5 (9.61%)	8 (15.38%)	3 (5.77%)	13 (25%)	2 (3.85%)	4 (7.7%)
Students	101 (24.16%)	31 (7.42%)	19 (4.54%)	85 (20.34%)	72 (17.22%)	25 (5.98%)	85 (20.34%)

The table-42 above reveals that there are many other options that are lacking in most of the existing e-learning systems and those items and features needs to be incorporated to improve the overall experience of e-learning. 32.69% of the proficient staff and 24.16% of the students are of the opinion that the e-learning system should include latest news and events so that they shall remain knowledgeable about the latest happenings and upcoming events in order to participate in those events. Graphics and other related media is also considered important in an online learning environment with 25% of the proficient staff members and 20.34% students responded in its favour. Apart from these features, other items to be included in order of priority are the web 2.0 items and references with the response of 7.7% of the proficient staff members and 20.34% students.

5.2.21 Expectations from E-learning

1. Allow all students to work independently at their own pace

Table-43 Independence of Students to work at their own pace

Scale	Proficient Staff	Students	Tabulated Value at 5% for df =2	Chi-Square (X^2)
Strongly Agree	11	140	5.991	5.84
Agree	39	274		
Neutral	2	4		
Disagree	0	0		
Strongly Disagree	0	0		

Online courses tend to be self paced, allowing students to spend the time necessary to complete assignments and to have more control over how they progress through the requirements of the course. 96.15% of the proficient staff agree that students should be allowed to work independent of other students and time to work at their own pace and speed. 3.85 % of the proficient staff remained neutral on commenting over this issue. Whileas 99.05% of the students and learners are of the opinion that they must be allowed to study at their own pace because of the fact that some of the students are not able to cope and maintain pace with other students. This can develop a sense of incompetence and poor performance among those students and thus in turn would affect the overall performance of the system. 0.95% of the students remained neutral to comment on the issue (Table-43).

On applying the chi-square test, it was found that the calculated chi-square value is less than the tabulated value. Hence, there is no significant difference among proficient staff members and students with regard to the self pace of learning and teaching in online environment.

2. Provide an explicit orientation to the course structure and requirements

An explicit, precise and open orientation to the course structure and requirements is must at the beginning of every session. As there is infancy in an online instruction in India, a sufficient knowledge about the working and requirements of the system should be provided to the students so that they do

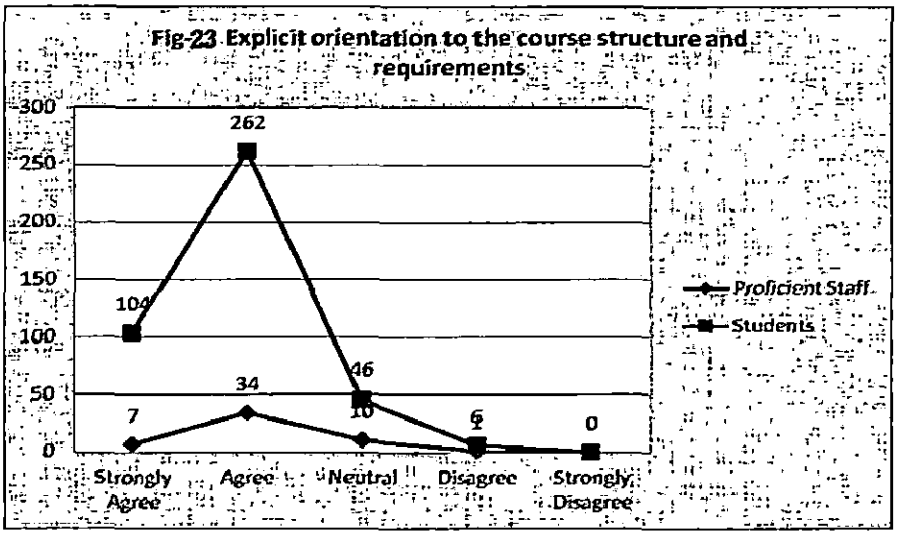
not find themselves on a strange planet of hopeless escape. Asynchronous online courses are designed in such a way that there is a very little choice of features that students can use. If they opt not to use a feature they may miss out on content.

Table-44 Explicit orientation to the course structure and requirements

Scale	Proficient Staff	Students	Tabulated Value at 5% for df =3	Chi-Square (X^2)
Strongly Agree	7	104	7.815	5.35
Agree	34	262		
Neutral	10	46		
Disagree	1	6		
Strongly Disagree	0	0		

The data from the table-45 reveals that 78.84% of the proficient staff and 87.55% of the students believe that the orientation course structure and requirements at the beginning of the session is extremely important, whileas 19.23% of the proficient staff and 11% of the students remained neutral. However, 1.92% and 1.43% of the proficient staff members and students showed disagreement with the statement.

On applying chi-square test, it was found that the chi-square calculated value is less than the tabulated value at 5% for 3 degrees of freedom. The Chi-Square test therefore reveals that there is no significant difference among the proficient staff members and students in providing explicit orientation course structure and requirements.



3. Allow easily access to any part of the course

Today when we talk in terms of providing uninterrupted, free and open access to one and all, the online courses in Library and Information Science should also try to provide easy access to all modules of the course at any period of time during the course. Some of the e-learning systems allow students to complete assignments of the back date, allowing them to access resources and content and download them at infinite number of times and those universities are the most successful online delivering institutes.

Table-45 Easy access to any part of the course

Scale	Proficient Staff	Students	Tabulated Value at 5% for df =3	Chi-Square (X^2)
Strongly Agree	19	379	7.815	44.4
Agree	1	37		
Neutral	1	0		
Disagree	31	2		
Strongly Disagree	0	0		

From the above table-46, it is confirmed that 96.15% of the proficient staff show agreement that the students should be allowed to access any part of the course and 99.52% of the students are in favour of it. However, 1.92% of the proficient staff members and 0.48% of the students disagree with the statement. The disagreement is because of the fact that the students might get distracted to other parts of the course which they find more interesting and full of multimedia and thus they may opt out of the important sections of the course structure leading to their poor results.

On applying chi-square test, it was found that the calculated chi-square value is much higher than the tabulated value at 5% for 3 degrees of freedom. Hence, there is a significant difference in the opinions of proficient staff members and students in allowing easy access to any part of the course.

4. Allow students to easily communicate with other students

The interpersonal communication within the same groups in a system and the intrapersonal communication with the system are two important things that are to be taken care of when teacher and learning in an online environment. The

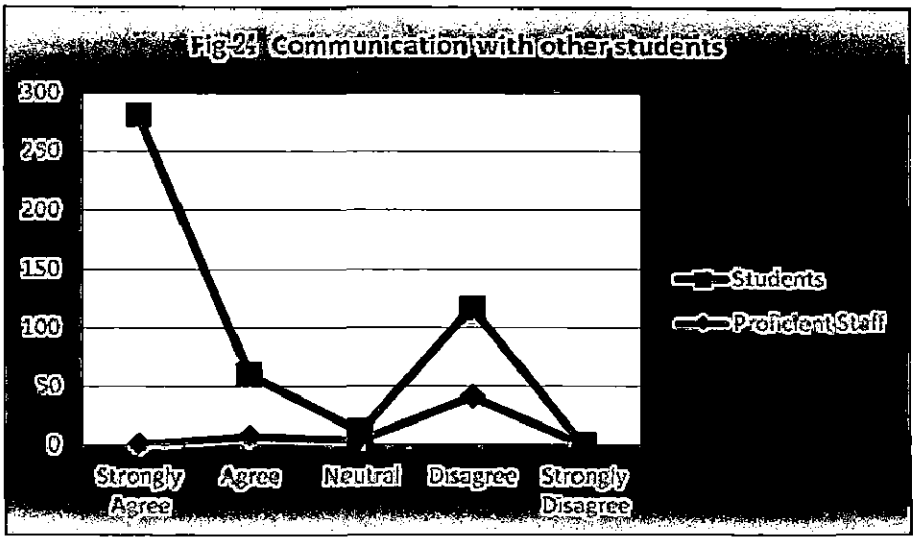
intrapersonal communication is mainly associated with teachers communicating with students and vice versa, students communicating with the teachers, online experts and technical experts within the system. However, interpersonal communication is associated with social networking, group chats and within friend circles in an online delivery system.

Table-46 Communication with other students

Scale	Proficient Staff	Students	Tabulated Value at 5% for df =3	Chi-Square (X^2)
Strongly Agree	0	281	7.815	109
Agree	7	53		
Neutral	4	8		
Disagree	41	76		
Strongly Disagree	0	0		

The table-47 above reveals that the 79.91% students and 13.46% of the proficient staff members are in favour of communication with other students easily. But 78.85% of the e-learning proficient staff members and 18.18% of the students disagree with the statement and are completely against it. However, 7.69% of the proficient staff members and 1.91% students remained neutral to comment in this regard.

On applying chi-square test, it was found that the calculated chi-square value is higher than the tabulated value at 5% for 3 degrees of freedom. Hence, there is a significant difference among professional staff and students in allowing the learners to communicate with each other. However, the communication must be present during the course on a personalized form for the students to feel motivated. Communication between the teacher and students plays a pivotal role for effective knowledge transfer. But, the social communication with other students is not in the milieu of the academic systems.



5. Provide discussion opportunities related to the content

Discussions, deliberations and debates over the various subject related topics in a course from an important component of the e-learning systems. Discussions help in analyzing the prospect of the topic of debate through various approaches and angles, thus enhancing the viewpoint of students regarding it.

Table-47 Discussion opportunities

Scale	Proficient Staff	Students
Strongly Agree	13 (25%)	317 (75.84%)
Agree	39 (75%)	97 (23.21%)
Neutral	0	4 (0.95%)
Disagree	0	0
Strongly Disagree	0	0

The data from the table-48 above discloses the fact that discussions are an important part of e-learning system as 100% of the proficient staff members and 99.05% of the students agree that they should be provided with discussion opportunities related to the content. Whileas, 0.95% of the students remained neutral in this regard.

6. Involve students in reviewing the work of other students online

Reviewing of one's assignments and understanding the grading system in an online course is a reasonable expectation of students. Typically, it is a matter of entering the data that is then automatically posted for the student to view privately. It is a basic element of an effective teaching.

Table-48 Reviewing the work of other students online				
Scale	**Proficient Staff**	**Students**	**Tabulated Value at 5% for df =4**	**Chi-Square (X^2)**
Strongly Agree	5	82	9.488	20
Agree	27	112		
Neutral	11	65		
Disagree	9	127		
Strongly Disagree	0	32		

The table-49 above shows the varied response as 61.54% of the proficient staff members and only 46.41% of the students are in favour of allowing students to review the work of other students. Whileas, 17.30% of the proficient staff members and 38.04% of the students completely disagree with the statement and 21.16% of the proficient staff members and 15.55% of the students remained neutral.

On applying chi-square test, it was found that the chi-square calculated value is higher than the chi-square tabulated value at 5% for 4 degrees of freedom. Hence, there is a significant difference among proficient staff members and students with regard to allow students in reviewing the work of other students online. The reason for this disagreement is because of the fact that some of the students are reluctant in disclosing the work to other students online because of the fact that reviewing the work of other students can develop a sense of insecurity and nervousness among the weaker category of students which in turn can result in their poor performance or even they may opt out of the course. In contrast to these factors, it can also nourish the competence and positive approach of students in improving their performance.

Chapter-6

Design and Development of E-Learning Prototype

CHAPTER-6

DESIGN AND DEVELOPMENT OF E-LEARNING PROTOTYPE

"If the only tool you have is a hammer, you tend to see every problem as a nail."

~ Abraham Harold Maslow (1908 – 1970)

6. E-Learning Web Portals

Web portals are like websites or internet gatekeeper that brings information in a cohesive way from diverse sources. Users obtain information on education, news, weather or stock by beginning their sessions on portals. Portals are some of the most visited sites on the internet. Making users stay for longer periods and driving internet traffic to their sites is the main aim of the portals. Internet advertising is the major source of revenue to them. In order to know more about the users for improving software design, service offerings etc. portals generate repeated use of their services. It is a common goal for web portals to develop a loyal user base that visits the site frequently and spend sufficient time per visit (Telang & Mukhopadhyay, 2005).

There are many types of web portals, depending on the subject area, industry, market or trend (Walker, 2006). Some of the main types of web portals will be described briefly while as e–learning portals related to the topic of interest will be discussed in detail. Some of the types are listed as under:

(a) Personal Portals

(b) News Portals

(c) Government web portals

(d) Social or cultural portals

(e) Corporate web portals

(f) Stock portals

(g) Search Portals

(h) Tender's Portals

(i) Hosted web portals

(j) Domain specific portals

(k) E-Learning portals

(a) Personal Portals

A personal portal is more likely a site on World Wide Web providing personalized pathway to the customized content. It is mainly designed mainly to use distributed applications. Personal portals can provide information related to any specific topic of interest and provide links to varied content beyond our reach of services. Portals provide a path to new knowledge and capabilities apart from providing links or content on the web.

(b) News Portals

The news and media around the globe are fast adapting to the new digital technologies. This is setting the mark for the beginning of news portals all across the globe by media houses. It provides the opportunity to reach far and wide to the maximum number of viewers in less time than the print media.

(c) Government Web Portals

World Wide Web has provided opportunities for governments to reach to their citizens by enabling them to take benefit of the fast growing rapid digital technologies. They include some key portals to the governments as well as portals developed for specific consultation.

(d) Social or Cultural Portals

Cultural portals combine various digitized collections of libraries, galleries, archives and museums. These portals provide access to a huge collection of cultural content that are not indexed by search engines. The collection mostly includes hand written books, artworks, sound recordings, music, diaries and letters of historical importance, archived websites as well as descriptive metadata associated with the cultural work. These portals can be based around a specific cultural or ethnic group, region or nationality.

(e) Corporate Web Portals

In early 1990s, there was a boom of corporate intranets. They grew in size and complexity and their increasing number posed many challenges to webmasters for their management. Many companies developed tools for managing data,

applications and information more easily through personalized views and web portals. Portal solutions included workflow management, policy management, content management and collaboration between groups. There is always an increase in user generated content, disparate data, file formats etc. and the need is felt to classify that information. Corporate portals offer such options and also provide employees with self-service opportunities.

(f) Stock Portals

Stock portals, also known as stock market portals, stock exchange portals or stock share portals, are web-based applications that alleviate the process of informing share holders with substantial online data like latest news, latest price, bids, announcements and reports. Some of the stock portals use online gateways through a central depository system (CDS) for the visitors to manage their portfolio or to buy and sell their shares online.

(g) Search Portals

These portals work like Meta search engines, cumulating results from several search engines into one page. They also provide links to websites in a specific field with specific purpose.

(h) Tender's Portals

Tender's portals act as a gateway to search/submit/modify/archive data on tenders. The professional processing of continuous online tenders is also done through these portals. By tendering portals, the process of submitting proposals, administration and assessment are done more easily on the web. E-tendering or online tendering is carrying out the same process of traditional tendering in an electronic format using the internet. It facilitates bidders to receive notifications on the tenders, filling of forms, submitting of proposals and bids online.

(i) Hosted Web Portals

They are the hosted services that serve as a tool for publishing information or presenting correlated data from distributed databases. Hosted web portals automatically customize the content generated from different modules to provide a vivid experience to their users. A new form of hosted web portals,

also called as cloud portals are egressing and showcasing the power of API (Application Programming Interface) to accommodate machine to machine interaction creating more fluidic user experience.

(j) Domain-Specific Portals

These are the portals offering specific services to companies with a special domain. For example property portals that give access to information regarding estate agents, firms and solicitors that offers conveyancing. Many industry-specific portals are coming up now along the same lines.

(k) E-Learning Portal

An e-learning portal is a website that offers learners and organizations a consolidated access to a wide range of learning and training resources from multiple sources. "A learning portal more than just a web site containing links to online courses, upcoming classes, job aids, and links to web sites, programs etc. It may also include a rating system, search functionality, bookmarking ability, and more Schone (2009). A web portal is defined, according to the UNESCO Bangkok Asia and Pacific Regional Bureau for Education, as "a one-stop knowledge shop of extensive information resources produced from all sources all over the world that can be accessed with no effort at one location". It provides an entry point to various online sources and resources dealing with a specific topic. Learning portals are usually education oriented, providing access to a wide array of educational material from different sources. It serves as a main entry point or a gateway to a wide range of services offered by an organization in a specific field of interest. There are four essential services usually associated with any learning portal:

(1) search engine

(2) e-mail

(3) links to other related sites

(4) personalized content.

It may also provide facilities such as members list, free downloads, chat etc. There are two basic types of e-learning portals. First one is the websites that offer e-learning courses where one can find information related to the courses

offered, mode of teaching and learning, duration of the course, fee structure and certification. Such information remains specific to the related websites only. The second type of e-learning portals more or less acts as e-learning search engines. There is a list of e-learning courses offered by different providers. The learner can search according to his/her interest the course they want to join and the best learning providers available through the portal. Both types of e-learning portals have their own benefits and weaknesses. In the first type, sometimes the information related to the provider is much more elaborative and in case of a particular service provider, we may not get information about other providers. In the second type, the information may not be found in detail, but from a wide range of options, we can compare and go for the best. Learning portals are easily accessible from any part of the world provided we have an internet connection and are flexible enough to be accessed at our own schedule round the clock. E-learning portals have not been fully used to their potential and they have the capability of making the global educational system more uniform, qualitative and cost-effective.

6.1 Benefits of an E-learning portal

The most noticeable benefits of an e-learning portal in the investigator's perspective are flexibility, accessibility and affordability. They provide access to learning from multiple sources by hosting, aggregating and distributing content. Portals can deliver learning to geographically dispersed and diverse workforce effectively. Some of the advantages offered by the learning portals are:

- Consolidated access to a wide range of aggregated content.
- Independence from a single content vendor.
- Immediate access to learning due to minimized deployment time.
- No large up-front technology and software acquisition costs.
- No cumbersome implementation behind firewalls.
- Flexible, fast access and convenient to learning from multiple locations.
- Low or no maintenance costs.
- Powerful assessment tools for assessing online instruction.

- Easily integrated with other databases and systems
- No clogging or overload of network infrastructure.

6.2 Evaluation of various select e-learning portals

The primary objective of the evaluation study is to identify and propose a unified campus-wide enterprise portal solution meeting the following definition: An integration platform that securely provides users with a central point for accessing, individualizing and configuring information and applications that are appropriate to their role(s) in the university. The portal also provides standard-based means to aggregate information for campus developers and information providers to offer applications and information to end users via an array of platforms including mobile.

The list of the select eight other universities for investigation which provide e-learning in various subject fields in India is given as under:

(i) IGNOU Online
(ii) Amity University, Noida U.P
(iii) Mumbai University (ILOL), CST Road, Mumbai
(iv) Delhi University (ILLL), New Delhi
(v) Kashmir University (EMMRC), J&K
(vi) Don Bosco University, Azara Guwahati
(vii) The Global Open University, Nagaland
(viii) Symbiosis International University, Pune

6.2.1 IGNOU Online

Indira Gandhi National Open University (IGNOU) is the world's largest Open University with highest number of enrolments in the world for open and distance courses. IGNOU started its online delivery of lectures through a series of interactive channels like ghyan-darshan and gyan-vyas. Apart from this, IGNOU started eGyankosh in 2006, a National Digital Repository of learning resources. The repository was developed using Dspace open source software, which ideates to store, index, preserve, distribute and share the digital learning resources of open and distance learning (ODL) institutions of the country. IGNOU started its online virtual classes from 2008 from a series of online

virtual classrooms for various subject fields including Library and Information Science through (Library and Information Science Virtual Education) LIVE web portal. However, IGNOU Online does not provide latest news and events, user's count, graphics, multimedia, site search engine and web 2.0 items.

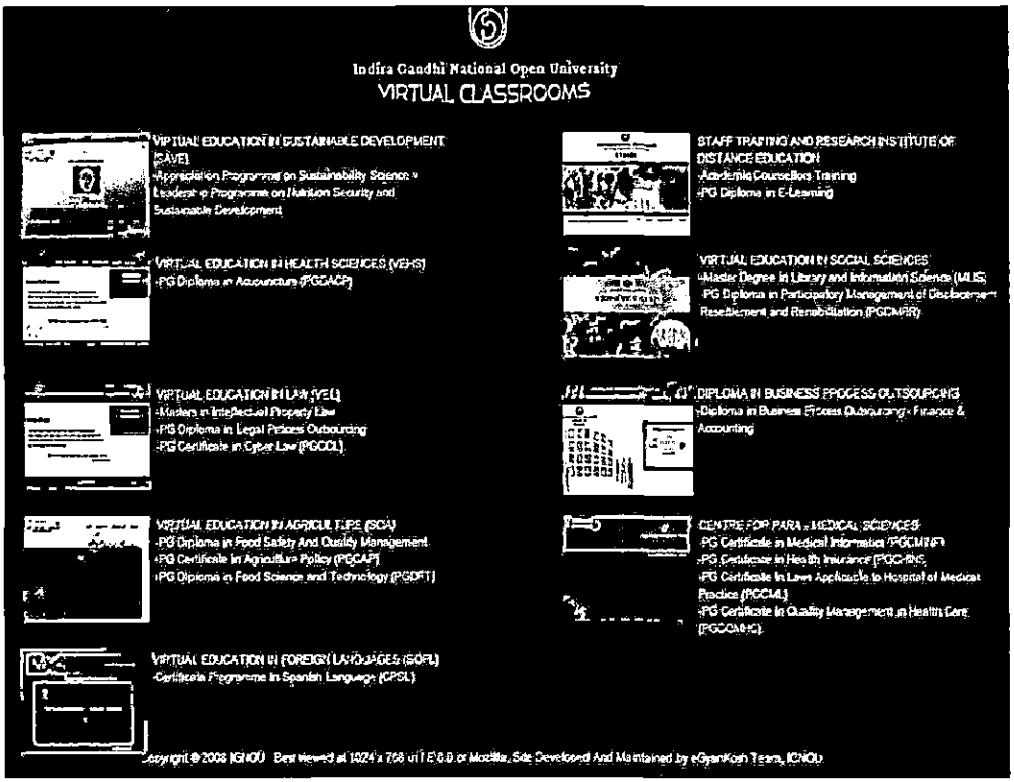


Figure-25 IGNOU Online

6.2.2 Amity University Online

Amity University was established in 2002 and it is one of the country's biggest education providers and has established its online learning through Amity Centre for e-learning to give individuals and organizations the competitive edge. It has started its online end-term examination twice in a year and online contact program through interactive live virtual classes from anywhere in the world. All the classes are archived for those who missed the live classes. All the assignments are to be submitted online and there are no hard copies to be submitted. Students can interact with faculty and peers through email and can also change over from regular distance learning program to e-learning and vice-versa. Amity University is trying to eliminate the barriers of time and distance creating universal, learning-on-demand opportunities for people,

companies and countries. It provides faster learning at reduced costs, increased access to learning resources, and clear accountability for all participants in the learning process with its e-learning program. It does not provide newsletter, latest news and events, user's count, A/V conferencing and web 2.0 items.

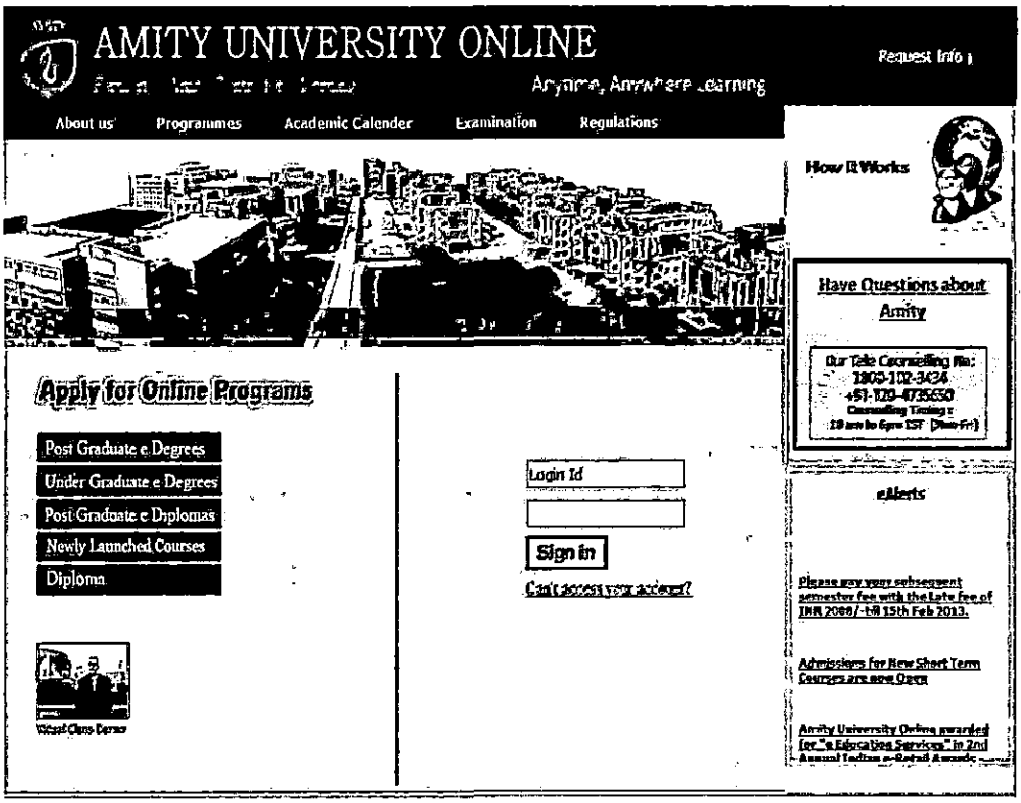


Figure-26 Amity University Online

6.2.3 Mumbai University DLLE

Mumbai University started its Department of Life Long Learning and Education (DLLE) in 1994 and from 2003, it started its first batch of e-learning programme. In the recent years, the University has designed and introduced many new short term and certificate courses in management, electronics and accounting. All the admission formalities are to be completed online along with the payment of fee, submission of application forms and a person can have live chat with the counselor in case of any queries or clarifications regarding the course structure and methods of delivery of learning and teaching.

The software used is an open source Joomla with clear learning objects and the portal is updated frequently with Interoperability compliance standards.

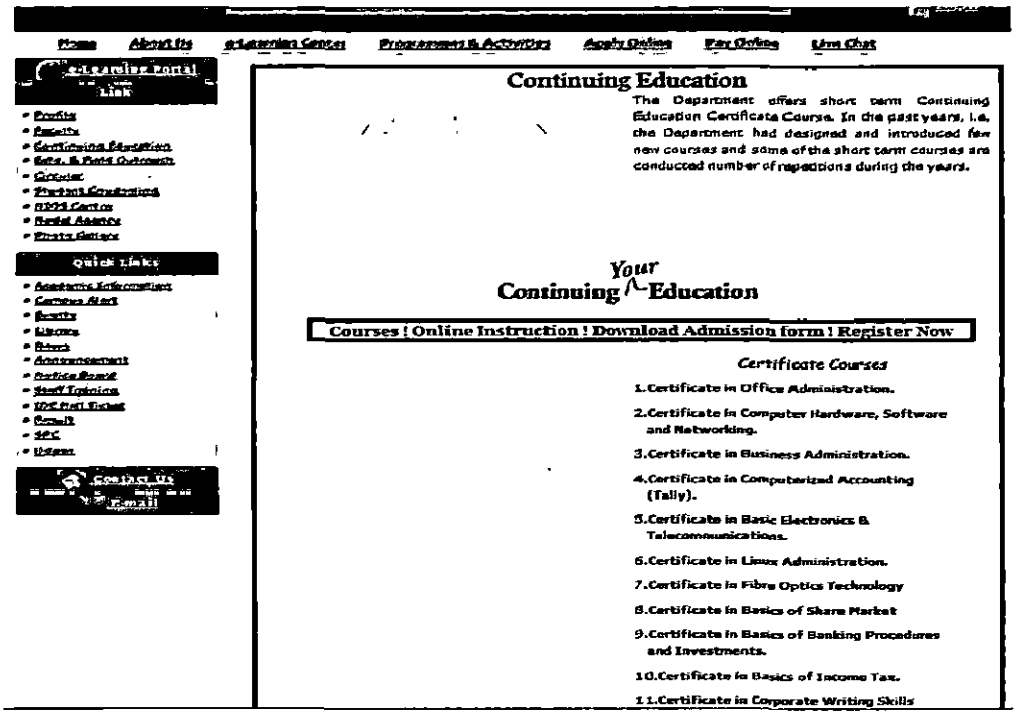


Figure-27 Mumbai University DLLE

However, no content or study material, newsletter, user's count, support and web 2.0 items are provided which is a major short comings of the portal.

6.2.4 Delhi University Virtual Learning Environment

Delhi University established its Virtual Learning Environment in the year 2007. It is providing education in various open courses online. It also provides open educational resources on various subject fields like sciences, humanities and social sciences. The University is covered in National Mission on Education through Information and Communication Technology (NME-ICT) project. The university is trying to incorporate web 2.0 items in the online learning web-portal like podcasts. The downloadable content on various subject fields in portable document format is also given along with the video lectures.

A clear, complete course overview or details is provided. All the sources of information are scholarly without personal opinions or bias. The website is updated frequently and follows International interoperability standards. Course architecture permits experts to add content, activities and assessments to extend learning opportunities. Objectives are matched to content requirements and to

the grade and skill levels of the intended audience. But some items like newsletter, news and events, user's count, support, content references or A/V conferencing are missing in its web portal. However, podcasts in the web 2.0 items are available for use.

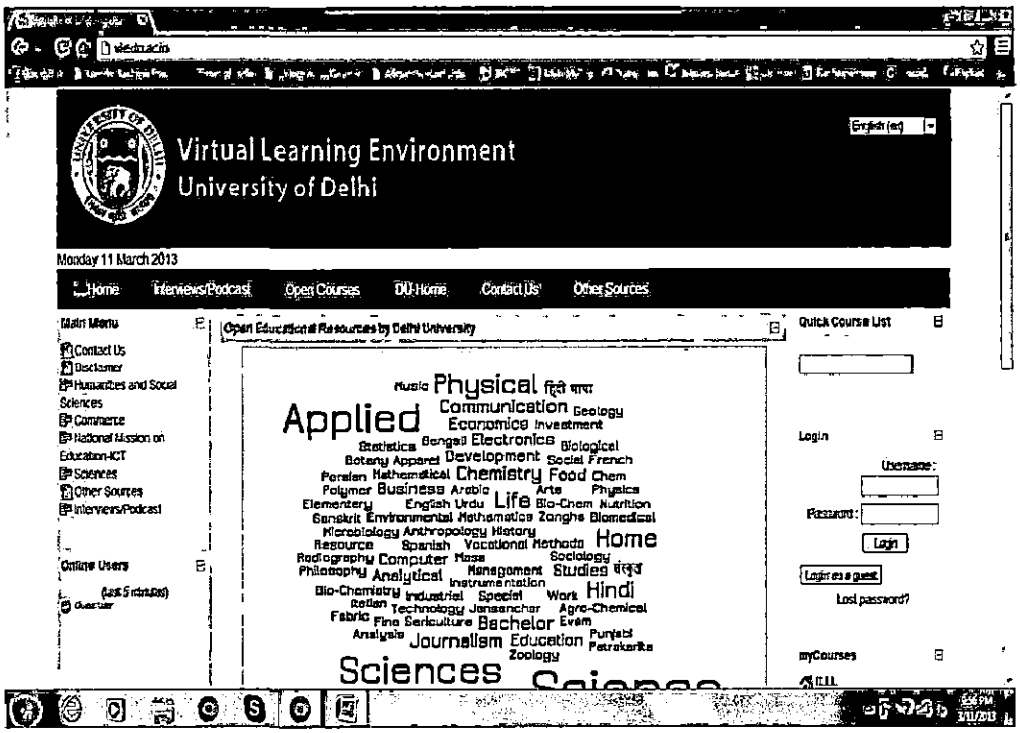


Figure-28 University of Delhi VLE

6.2.5 Kashmir University E-Learning

Educational Multimedia Research Centre (EMMRC) has been established in 1987 and from 2007, Kashmir university is using some features of e-learning like overhead projectors and video-conferencing mode of learning and teaching. However, the full-fledged e-learning courses are yet to come and the beta version of University of Kashmir e-learning is under construction. The major flaws in the website of e-learning is its inaccuracy, infrequent updation, poor responsiveness, no support, graphics, site search, multimedia and lack of web 2.0 items

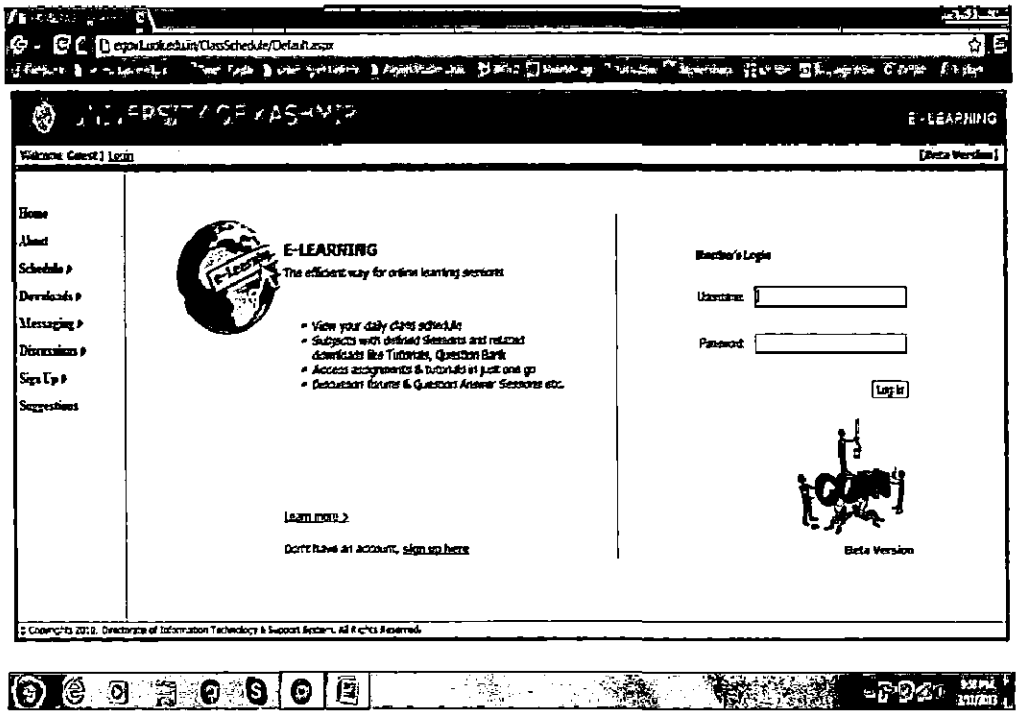


Figure-29 Kashmir University E-Learning

6.2.6 Don Bosco University

Established on 29th March 2008, Assam Don Bosco University aims to mould intellectually competent, morally upright socially committed and spiritually inspired persons at the service of India and the world of today and tomorrow, by imparting holistic and personalized education. It offers courses from the fields of Library and Information Science, management and engineering. It provides videos, discussion related opportunities through discussion boards and online counseling for students and learners. It provides online content and reading material like articles, news and e-books store. Using a state-of-art virtual classroom platform, DBU global students attend classes over the internet, interacting with teachers and experts of the finest institutions of the nation and fellow students placed across the globe. However, it does not provide any content or study material, newsletter, news and events, user's count, additional references, graphics, site search and web 2.0 items.

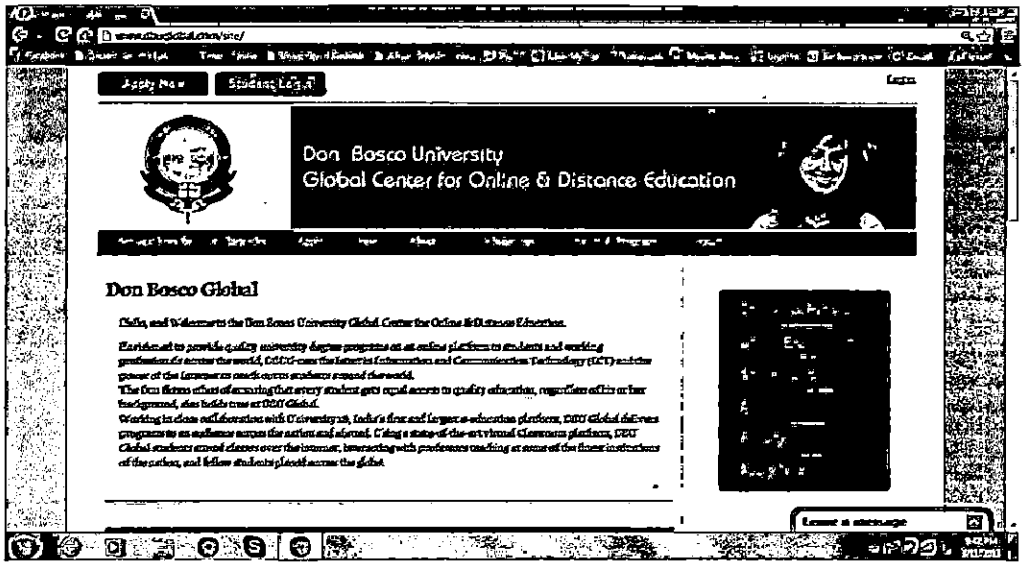


Figure-30 Don Bosco University E-Learning

6.2.7 The Global Open University

It was established in the year 2006 and it worked its way towards technology enabled learning and developed its online campus. It is providing a platform for providing internet enabled online education with 24x7 support, downloadable content, video lectures and live support for teaching and learning. However, it does not provide any newsletter, user's count, additional references, graphics, web 2.0 items and site search. Lack of A/V conferencing is a major drawback of the web portal.

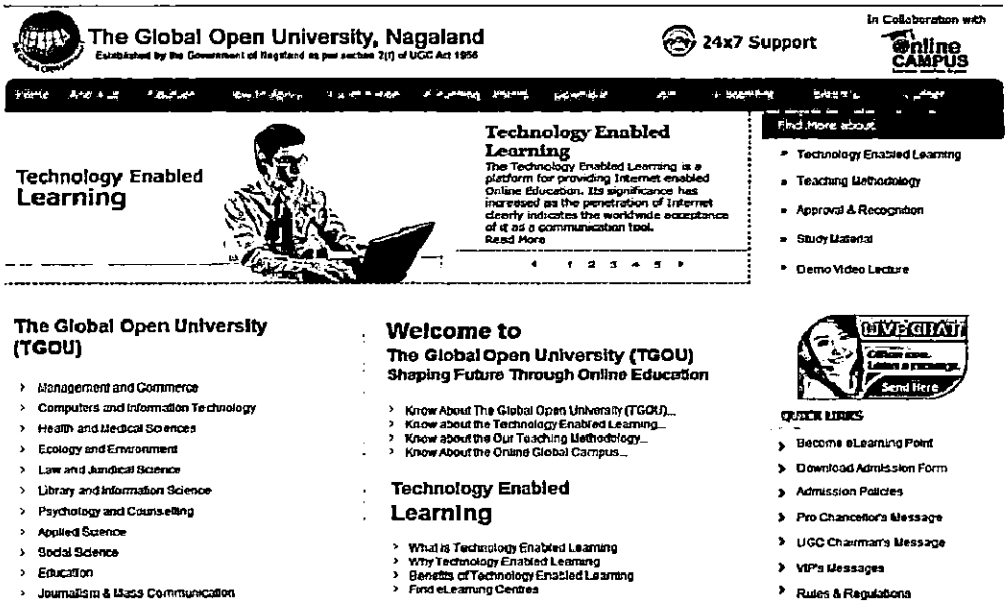


Figure-31 The Global Open University Online

6.2.8 Symbiosis International University

Symbiosis International University, Pune has become one of the largest autonomous distance education institutions in India after its inception in 2001. It has introduced the concept of blended learning and e-learning in distance education in 2002, combining all the three forms of learning, namely, published/printed self-learning material, e-learning, pre-recorded DVD lectures and faculty interaction (Chat Sessions and Virtual Classroom Facility). It has introduced highly interactive e-learning content as a supplementary learning methodology to improve the understanding of concepts through case studies and practical examples, thereby bridging the gap between a book and the classroom. The Virtual Classroom facility with the Faculties has removed the distance barrier between the teacher and the taught. This facility provided by SCDL is an additional student support service to interact with faculty members online and live. There is a Modular Course System with Credit Banking Facility and ability to take any single course and bank and accumulate credits for future transfer to other programs of SCDL thus providing flexible pathways of learning. However, no study material, user's count or web 2.0 items is provided. It is the most complete web portal among all the other select eight universities.

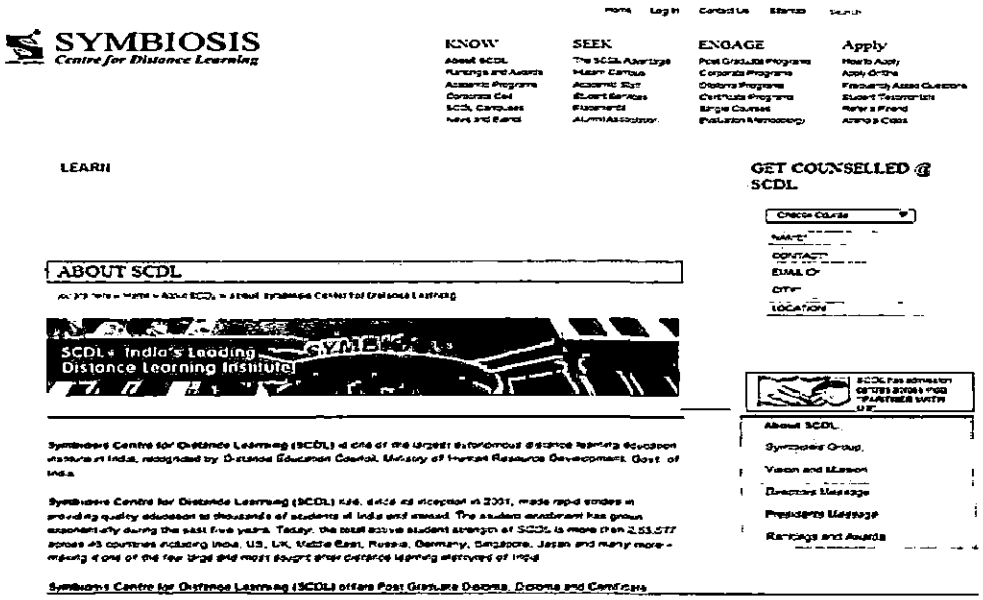


Figure-32 Symbiosis Centre for Distance Learning

Various evaluation criteria have been adopted by many universities all over the world that have been published for evaluation of web-portals and websites. The present evaluation criteria is devised as an amalgamation of various excellent evaluation criteria's adopted by:

1. The University of the Aegean (http://www.washington.edu/oea/pdfs/reports/OEAReport0211.pdf),
2. University of Illinois (http://www.library.illinois.edu/bix/pdf/genguide/WebEval.pdf)
3. Xavier University Library (http://www.xavier.edu/library/students/documents/website_evaluation.pdf) and
4. National Health Service Education for Scotland (http://www.knowledge.scot.nhs.uk/media/4088630/quality_assurance_checklists.pdf)

The criterion devised is formulated on the following categories of evaluation listed as under:

1. Accuracy
2. Objectivity
3. Up to Date (Currency)
4. Audience
5. Content/ Study Material
6. Study Material
7. Newsletter
8. News and Events
9. Software
10. Accessibility
11. Coverage
12. Usability
13. Functionality
14. Reliability
15. Effectiveness
16. Suitability
17. Responsiveness
18. Clarity
19. User's Count
20. Support
21. Standards Compliance
22. Stability
23. Additional References
24. Graphics
25. Multimedia
26. Web 2.0 Items
27. A/V Conferencing
28. Style
29. Site Search Engine
30. Credibility
31. Technical Properties
32. First Impression
33. Quality

Criteria	List of Universities								
	IO	AU	MU	DU	KU	DBU	GOU	SIU	LL
curacy	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
ectivity	To the point and free of bias	To the point and free of bias	To the point and free of bias	To the point and free of bias	To the point and free of bias	To the point and free of bias	To the point and free of bias	To the point and free of bias	To the point and free of bias
te (currency)	Updated less frequently	Updated weekly	Updated frequently	Updated weekly	Updated less frequently	Updated frequently	Updated frequently	Updated more frequently	Updated every day
dience	Students and in-service learners	Students	In-service and elderly learners	In-service learners	Students	Students	Students	Students	Students, experts, professionals and novices
tudy Material	Yes	Yes	No	Yes	Yes	No	Yes	No	Yes
vsletter	No	No	No	No	No	No	No	Yes	Yes
nd Events	No	Yes	Yes	No	No	No	Yes	Yes	Yes
ftware	PHP	Asp.net	Joomla	Word Press	Asp.net	Drupal	PHP	Asp.net	Joomla
ssibility	Only to registered members	Only to registered members	Only to registered members	Only to registered members	Only to registered members	Only to registered members	Only to registered members	Only to registered members	Accessible to all and to registered users also
erage	Lib. & Info. Science	Management	Management	Management	Management	Lib. & Info. Science	Management	Management	Lib. & Info. Science
ability	Learning Objects are appropriate for the scope it aims to cover	Learning Objects are appropriate for the scope it aims to cover	Learning Objects are appropriate for the scope it aims to cover	Learning Objects are appropriate for the scope it aims to cover	Does not have appropriate Learning Objects to cover its scope	Learning Objects are appropriate for the scope it aims to cover	Learning Objects are not clearly defined	Learning Objects are appropriate for the scope it aims to cover	Learning Objects are appropriate for the scope it aims to cover

tionality	A clear, complete course overview or details is not provided	A clear, complete course overview or details is not provided	A clear, complete course overview or details is not provided	A clear, complete course overview or details is provided	A clear, complete course overview or details is not provided	A clear, complete course overview or details is provided	A clear, complete course overview or details is provided	A cle compl cour overvie detail provic
iability	All the sources of information are scholarly and well defined without personal opinions	All the sources of information are scholarly without personal opinions	All the sources of information are scholarly without personal opinions	All the sources of information are scholarly without personal opinions	Sources of information is altogether absent	All the sources of information are scholarly without personal opinions	All the sources of information are scholarly without personal opinions	All tl source informa are scho witho perso opinic
iveness	Objectives are matched to content requirements and to the grade and skill levels of the intended audience	Objectives are matched to content requirements and to the grade and skill levels of the intended audience	Objectives are matched to content requirements and to the grade and skill levels of the intended audience	Objectives are matched to content requirements and to the grade and skill levels of the intended audience	Objectives are not clear to the grade and skill levels of the intended audience	Objectives are matched to content requirements and to the grade and skill levels of the intended audience	Objectives are matched to content requirements and to the grade and skill levels of the intended audience	Objecti are mat to cont requiren and to grade skill leve the inte audier
ability	Course architecture permits tutors to add content, activities and assessments to extend learning opportunities	Course architecture permits tutors to add content, activities and assessments to extend learning opportunities	Course architecture does not permit tutors to add content, activities and assessments to extend learning opportunities	Course architecture permits experts to add content, activities and assessments to extend learning opportunities	Course architecture does not permit tutors to add content, activities and assessments to extend learning opportunities	Course architecture does not permit tutors to add content, activities and assessments to extend learning opportunities	Course architecture does not permit tutors to add content, activities and assessments to extend learning opportunities	Cours architec does not p tutor to add co activities assessme extend lea opportur
siveness	Average response and normal web	Good response and normal web	Average response and normal web	Average response and good web	Poor response and average web	Good response and normal web	Average response and dull web	Avera response good w

	accessibility	accessibility	accessibility	accessibility	accessibility	accessibility	accessibility	accessi
Clarity	Content and learning activities are not clearly aligned with learning outcomes	Content and learning activities are clearly aligned with learning outcomes	Learning activities are clearly aligned with learning outcomes	Content and learning activities are clearly aligned with learning outcomes	Content and learning activities are not clearly aligned with learning outcomes	Content and learning activities are not clearly aligned with learning outcomes	Content and learning activities are clearly aligned with learning outcomes	Learn activiti clear aligned learn outco
Users Count	No	No	No	No	No	No	No	No
Support	Yes	Yes	No	No	No	Yes	Yes	Ye
ndards Compliance	The course is constructed in compliance with technical interoperability standards and SCORM 1.2 or IMS Content Packaging 1.1.2 compliant at a minimum	The course is constructed in compliance with technical interoperability standards at a minimum	The course is constructed in compliance with technical interoperability standards at a minimum	The course is constructed in compliance with technical interoperability standards at a minimum	The course is constructed in compliance with technical interoperability standards at a minimum	The course is constructed in compliance with technical interoperability standards and SCORM 1.2 or IMS Content Packaging 1.1.2 compliant at a minimum	The course is constructed in compliance with technical interoperability standards and SCORM 1.2 or IMS Content Packaging 1.1.2 compliant at a minimum	The cou construc compli with tec interoper standard is SCORM IMS Co Packa 1.1.2 con at a mini
Stability	Procedure of acquiring username and password, correct transaction, encrypting	Procedure of acquiring username and Password and access control	Procedure of acquiring username and Password and access control	Procedure of acquiring username and password, correct transaction, encrypting	Procedure of acquiring username and Password and access control	Procedure of acquiring username and password, correct transaction, encrypting	Procedure of acquiring username and Password and access control	Procedu acquir usernam passw corre transac encryp

	messages, and access control			messages, and access control		messages and access control		messag access c
Additional ontent/References	No	Yes	Yes	No	No	No	No	Ye
Graphics	No	Yes	Yes	Yes	No	No	No	Ye
a (mp4, mp3, pdf, txt, gif)	No	Yes	Yes	Yes	No	Yes	Yes	Ye
Web 2.0 Items	Nil	Nil	Nil	Podcast	Nil	Nil	Nil	Ni
A/V conferencing	Yes	No	Yes	No	Yes	Yes	No	Ye
Style	Design is clear, consistent and provides appropriate instructions for navigation and interaction	Design is clear, dynamic and provides appropriate instructions for navigation and interaction	Design is clear, consistent and provides appropriate instructions for navigation and interaction	Design is clear, consistent and provides appropriate instructions for navigation and interaction	Design is simple and does not provide proper navigation and interaction	Design is clear, consistent and provides appropriate instructions for navigation and interaction	Design is simple and provides less appropriate instructions for navigation and interaction	Desig clea dynami provi approp instruct for naviga and interac
ite Search Engine	No	No	Yes	Yes	No	No	No	Ye
Credibility	Free of grammatical, spelling, or typographical errors	Free of grammatical, spelling, or typographical errors	Free of grammatical, spelling, or typographical errors	Free of grammatical, spelling, or typographical errors	Free of grammatical, spelling, or typographical errors	Free of grammatical, spelling, or typographical errors	Free of grammatical, spelling, or typographical errors	Free gramma spellin typograp erro

echnical Properties	Information on the website is available in a format that require special viewers and plug-ins	Information on the website is available in a format that require special viewers and plug-ins	Information on the website is available in a format that does not require special viewers and plug-ins	Information on the website is available in a format that does not require special viewers and plug-ins	Information on the website is available in a format that require special viewers and plug-ins	Information on the website is available in a format that does not require special viewers and plug-ins	Information on the website is available in a format that require special viewers and plug-ins	Information on the website is available in a format that does not require special viewers and plug-ins	Information on the website is available in a format that does not require special viewers and plug-ins
First Impression	Balance between textual and visual elements	Balance between textual and visual elements	Aesthetic and well organized	Balance between textual and visual elements	Aesthetic	Aesthetic and well organized	Balance between textual and visual elements	Balance between textual and visual elements	Balance between textual and visual elements and attractive content presentation (aesthetic)
Quality	Accepted Expressive Language	Accepted Expressive Language and good quality	Expressive and Interpretable Data	Accepted Expressive Language and good quality	Expressive and Interpretable Data	Accepted Expressive Language	Ease of understanding / Interpretable Data	Accepted Expressive Language and good quality	Accepted Expressive Language, good quality and Ease of understanding / Interpretable Data

Table-49 Evaluation of various select E-Learning web-portals

1. IO- IGNOU Online
2. AU- Amity Online
3. MU- Mumbai University
4. DU- Delhi University
5. KU- Kashmir University
6. DBU- Don Bosco University
7. GOU- Global Online University
8. SIU- Symbiosis International University
9. LL- Lislearn

On the basis of the evaluation of the websites/web portals under study, it can be stated that all the e-learning systems are accurate except Kashmir University as the beta version of its portal is under construction and not functional. The objectivity of all the portals is to the point and free of bias with frequent updation of the information. Government universities like IGNOU, Mumbai University and Delhi University have audience which mainly consists of students, in-service candidates and elderly learners, whileas the private universities mainly focus on the learning and training of students only. However, the designed prototype Lislearn is for students, experts, professionals and novices as well.

Out of the eight university portals evaluated, three universities do not provide study material for download which includes Mumbai University, Don Bosco University and Symbiosis International University. All university e-learning portals have designed on the platform of open source softwares like Joomla, Drupal and PHP etc. showing the trend in the selection of software by the universities in India. Learning objects of all the portals are appropriate and well defined for the scope and aims to cover except for the Global Open University which are not clearly defined.

None of the government universities have provided a clear and complete overview of the courses, whileas a clear and complete course details are provided by all the private university e-learning portals. However, the private universities do not permit the tutors to add content, activities or assessments on their own which in turn hampers the extension of learning opportunities.

Apart from the missing additional references by some universities, web 2.0 items are missing in almost all the universities except Delhi University and Lislearn. Audio/video conferencing is also missing in Amity University, Delhi University and Global Open University.

Information on the websites/web portals is available in a format that require special viewers and plug-ins except in Mumbai University, Delhi University, Don Bosco University and the prototype designed by the investigator. All the drawbacks found in these e-learning portals have been eliminated in Lislearn.

6.3 Lislearn: An e-learning prototype (www.lilslearn.in)

The e-learning market is on a boom world over and is predicted to follow an upward swing with more and more organizations implementing this mode. The ability of e-learning lies in its potential to provide right information in an instance irrespective of the geographical boundaries and barriers. The ICT led initiatives in the form of e-learning support, open courseware, digital repositories are now seen in majority of the open and distance learning systems. There is a lack of full-fledged e-learning system in library and information science education. Here is the need to develop an e-learning system in LIS education after ascertaining some of the select web-based learning systems, which will provide free access to LIS professionals, teachers and students. Lislearn is one such attempt to overcome the lacking of such a system in library and information science.

LISLearn is basically an e-learning portal specifically designed for Library and Information Science professionals and students. It is an initiative to bring together all the library and information science professional community at one single platform, so that they can share their expertise and views.

It is developed in English language and envisages a space for teachers, students and other professionals to express their ideas and share their thoughts on the subject. It also involves the uploading of content created by and for library professionals. These will be articles on various topics, short articles written by teachers on subjects of their choice including classroom practice, their experiences in library and information science schools and the ideas they have tried to experiment on. Links are provided to websites, gateways, universities, blogs and forums to provide access to valuable and important sources of information to library and information science professionals and students.

6.3.1 About Technology and Software Used

Joomla (www.joomla.org) is one of the world's most popular open source CMS (content management system) used for everything from creation of websites, portals, blogs and intranets. It is a free software package designed

using sound pedagogical principles, to help educators create effective online learning communities.

The name Joomla is derived from the Swahili word "Jumla", a phonetic spelling, which means all together or as a whole. It is mostly used by programmers and education theorists. Joomla is a software package for producing internet or web based courses and websites. It is specially designed and premeditated to maintain a social constructionist framework of online education. Joomla keeps track of all content on our website or portal, much like a library keeps track of books and stores them. Content may include text, images, audio/video or just anything we can think of. It is available freely as open source software (under GNU General Public License). Basically, this means Joomla is copyrighted, but users have additional advantages and freedom. Users are allowed to copy, use or modify as per their own requirements. It offers that user agree to:

(a) provide the source to others

(b) not remove or modify the original license and copyrights and

(c) apply the same license to any derivative work.

Joomla installs on any computer that can run PHP (Hypertext Preprocessor) and can support an SQL (Special Query Language) database for example, MySQL. The latest release of Joomla is 2.5 and 3.1.0 which for the first time includes multi-database support with the addition of Microsoft SQL server apart from MySQL server. It can be run on Mac operating systems, windows and many flavours of Linux (Red Hat or Debian GNU).

6.3.2 Requirements

- **PHP**
  - PHP 5.2.0 or newer version is needed with session support and the Standard PHP Library (SPL) extension.
  - To support uploading of ZIP files, PHP zip extension is needed.
  - To support of multibyte strings (eg. UTF-8, which is currently default), mbstring and ctype extensions needs to be installed.

- GD2 support in PHP is required to display inline thumbnails of JPEGs ("image/jpeg: inline") with their original aspect ratio.
- When using the "cookie" authentication method, the mcrypt extension is required for 64-bit machines and is strongly suggested for most users. Not using mcrypt cause phpMyAdmin to load pages significantly slower.

- **MySQL** 5.5 or newer
- **Web browser** with cookies enabled.

phpMyAdmin manages the whole MySQL server (needs a super-user) as well as a single database. To accomplish the task, we need to properly set up MySQL user who can read/write only the desired database. It's up to the administrator to look up the appropriate part in the MySQL manual.

Currently phpMyAdmin can:

- Browse and drop tables, fields, views, indexes and databases.
- Create, copy, rename and alter databases, fields, tables and indexes.
- Maintenance of server and databases with proposals on server configuration.
- Edit, bookmark and execute any SQL-statement, even batch-queries.
- Load text files into tables.
- Read and create dumps of tables.
- Export data to various formats: PDF, CSV, XML, ISO/IEC 26300 – Open Document Text and Spreadsheet, Word, Excel and $L^{A}T_{E}X$ formats
- Administer multiple servers.
- Manage MySQL users and privileges.
- Verify referential integrity in MyISAM tables.
- Use Query-by-example (QBE), create complex queries automatically connecting required tables.
- Generate PDF graphics of your Database layout.
- Search globally in a database or a subset of it.

- Convert stored data into any format using a set of predefined functions, like displaying BLOB-data as image or download-link.
- Support foreign keys and InnoDB tables.
- Support mysqli, the improved MySQL extension.
- Communicate in 57 different languages.

Many people find it difficult to understand the concept of user management with regards to phpMyAdmin. When a user logs in to phpMyAdmin, that username and password are passed directly to MySQL. All users must be valid MySQL users; phpMyAdmin only allow manipulating the MySQL user account information. phpMyAdmin can compress (GZip, Zip-RFC 1952- or Bzip2 formats) dumps and CSV exports if we use PHP with Zlib support (--with-zlib) and/or Bzip2 support (--with-bz2). Appropriate support may also need changes in php.ini.

6.3.3 Download and Installation

Installing Joomla is very easy and it comes with a built-in installer which makes setting up our site very easy. Before installing Joomla, there are a couple of prerequisites that need to be installed first.

- Hosting - whether it is a dedicated server, or shared hosting plan, some sort of web hosting is needed that meets the following requirements:
  - PHP v. 5.2+
  - MySQL 5.04+
  - Apache 1.3 or above
- MySQL Database - An access to a MySQL database is needed, as well as the following credentials:
  - DB Name
  - Host Name
  - Username
  - Password
- FTP Client - for transferring files to our server, if we don't already have an FTP client.

When the above requirements are met, Joomla is ready to be installed. To begin installation, following steps needs to be followed:

Pre-Installing Steps

→ Step 1. Create a MySQL database from cPanel->MySQL Databases and add a user to it.

→ Step 2. After downloading the archive file of Joomla 2.5 with the latest stable version from the official web site, we need to store it in a folder on our local computer and extract the archive.

→ Step 3. All the content is uploaded from this local folder to the directory on the server where Joomla 2.5 is stored. The easiest way to upload the files and the folders is through an FTP client.

→ Step 4. Open the URL of the newly-uploaded Joomla script. If the content is uploaded in the main web directory, we use http://yourdomainname.com. Then the domain and the directory names are replaced with the ones for our web site.

Installation Steps

→ Step 1. The Joomla installation page gets loaded:

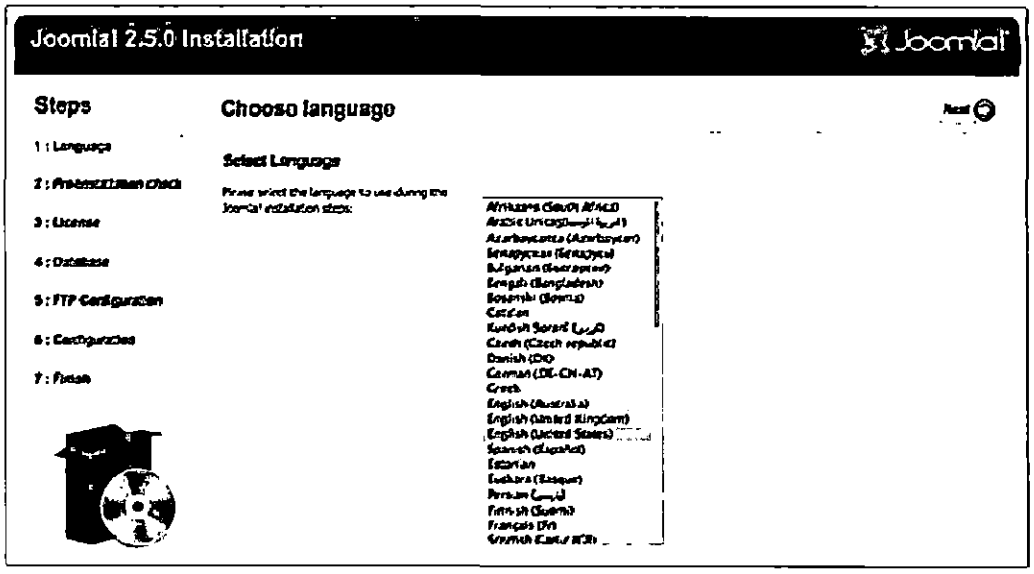


Figure-33 Joomla 2.5.0 Installation

Then the language for installation is selected and is valid only during installation.

→ Step 2. On the next page Joomla will check whether the system requirements are met on the server.

If one or more are not met, a corresponding message will be shown. SiteGround servers are fully compatible with Joomla 2.5.0:

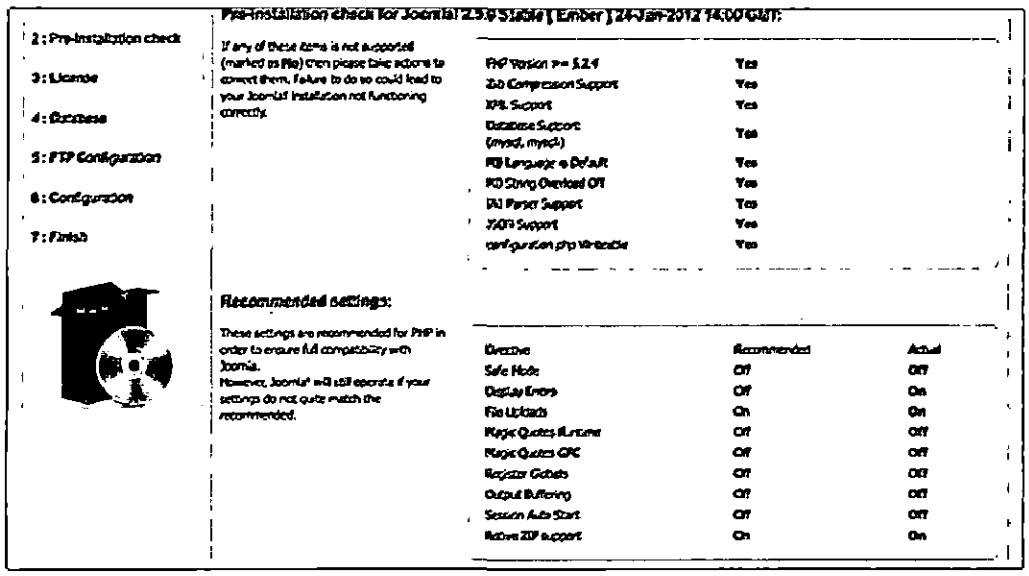


Figure-34 Pre-installation check for Joomla 2.5.0 stable

→ Step 3. After making sure that all system requirements are met, we proceed by clicking on the Next button from the top right menu. On the next page we read and accept Joomla's license.

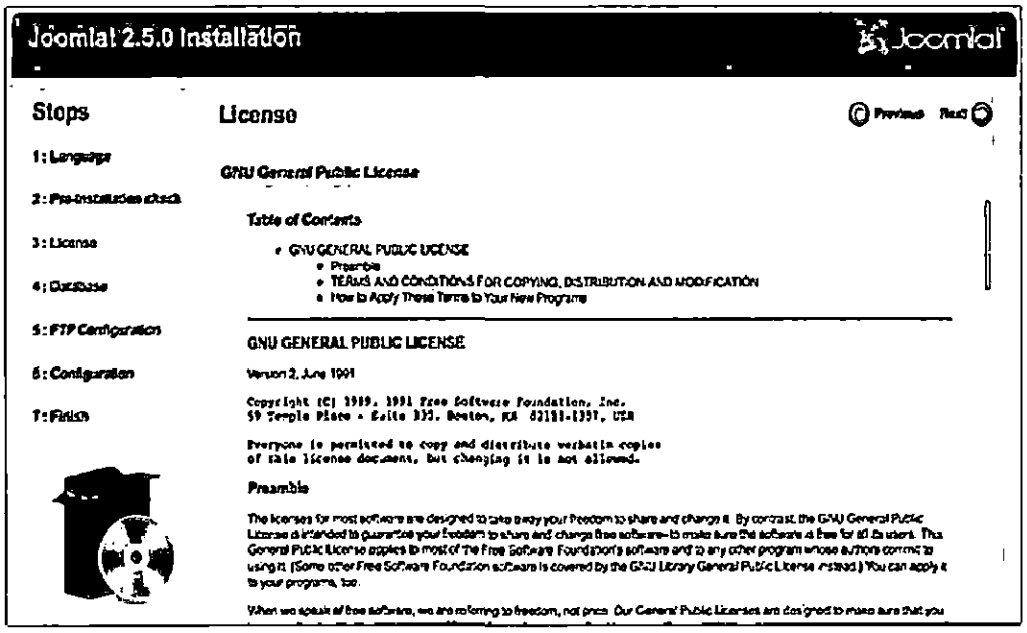


Figure-35 GNU (General Public License)

Again we click next to continue

→ Step 4. Here we enter the MySQL details for the new Joomla 2.5 installation. Using the ones set in Step 1. In the following screenshot we find an example entries and explanations for these fields:

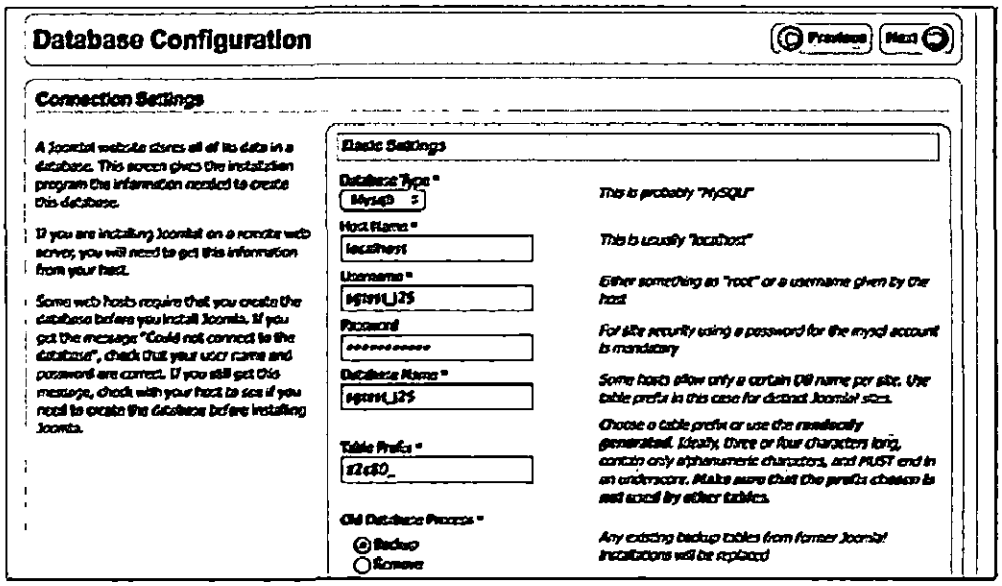


Figure-36 Database Connection Settings

→ Step 5. Next, we can set our File Transfer Protocol (FTP) configuration. Keeping the default settings we click Next to proceed.

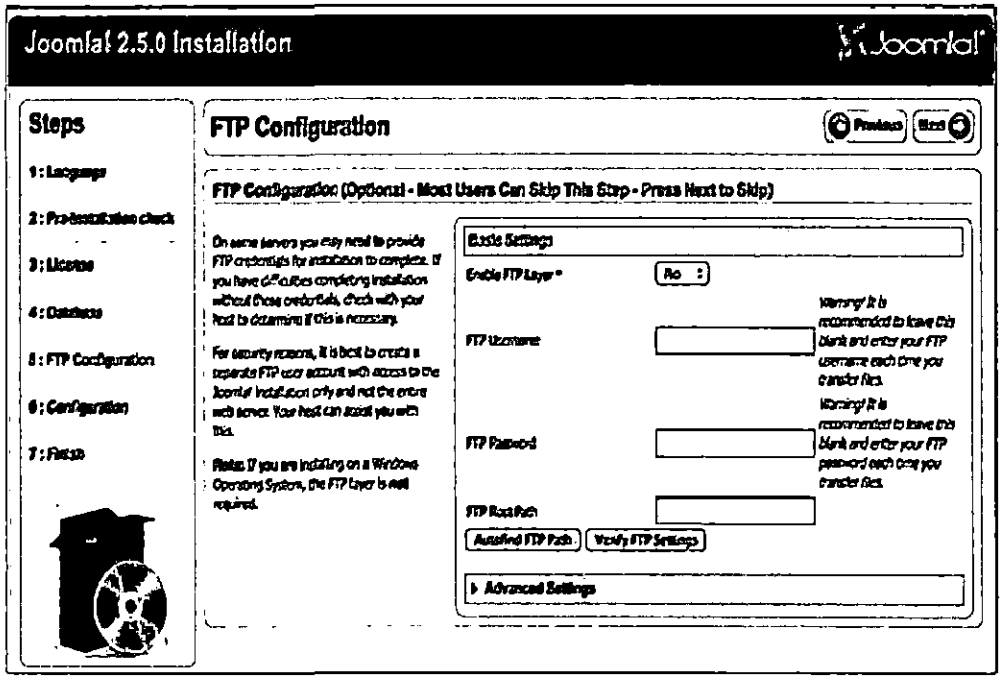


Figure-37 FTP Configuration

→ Step 6. On the current page the main Joomla 2.5 configuration is defined. We specify our site name, meta description and keywords, admin user, email and password.

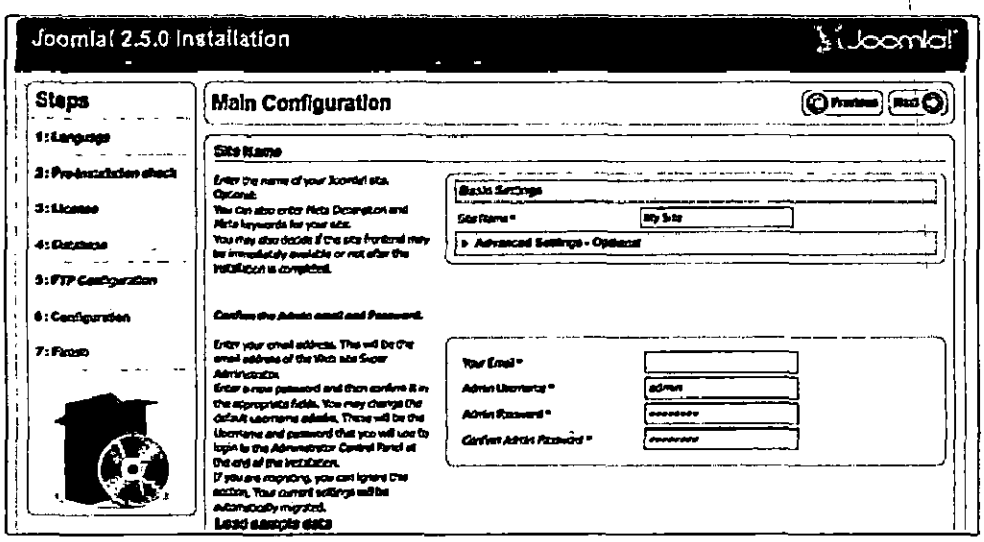


Figure-38 Main Configuration

Click on Next to proceed.

→ Step 7. In the last page of the installation wizard we receive a confirmation that Joomla 2.5 has been successfully installed.

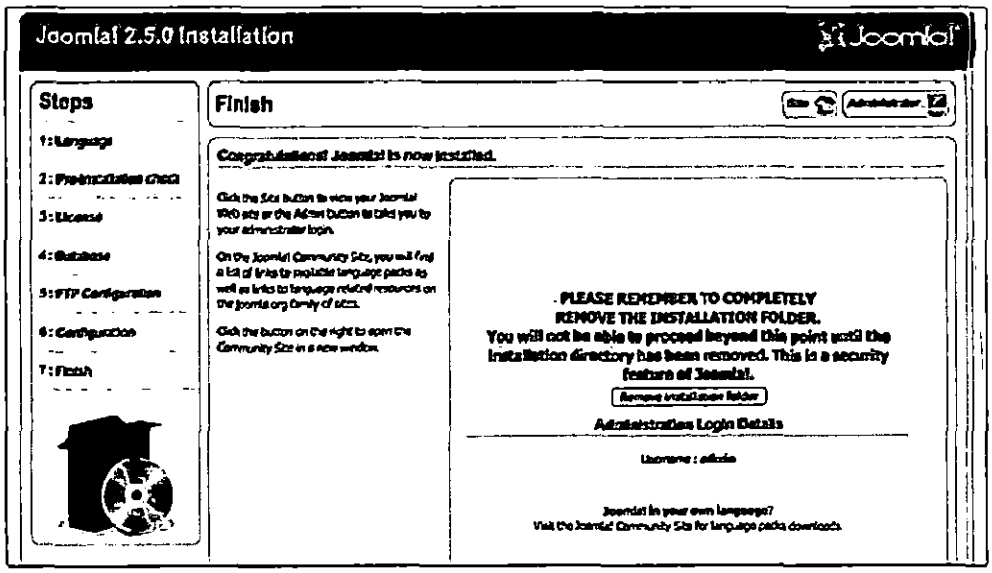


Figure-39 Finishing Installation

In order to access our new Joomla 2.5 web site we must delete the installation directory. This can be done with our FTP client. Our Joomla website is now installed.

6.4 Different Sections on the Portal

The different sections on the portal include the following:

6.4.1 Top Menu

- Home

A homepage, also known as index page or simply home, is the first page when we open any website from a web browser. Homepage is a gateway to vast knowledge resources through a single interface. A home page gives us information about the website, provides links to other web pages, provides login facility if available, and enlist items in the form of menus. Most of the homepages display upcoming events and latest news and updates related to their specific field.

A homepage is also used outside the context of websites to refer to the principal screen or home screen of a user interface or mobile device. At any point during browsing in a website, when home button is pressed, it takes us back to the main or index page of the web-portal or website.

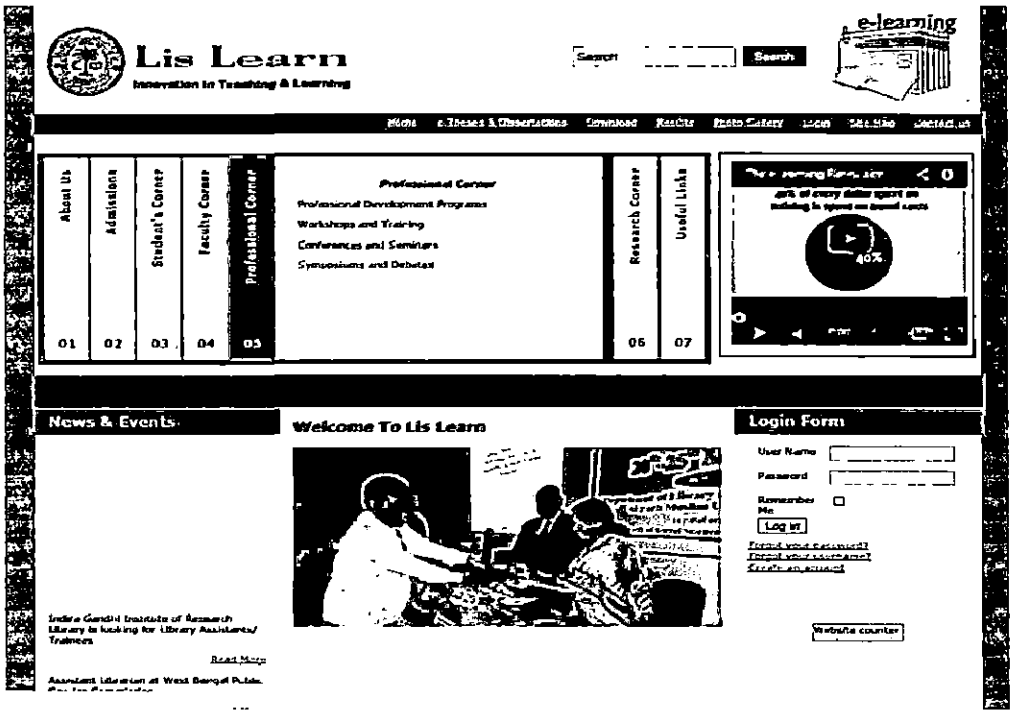


Figure-40 LISLearn Homepage

- Download (Content)
  - Pdf

- Audio
- Video
- Newsletter

This section includes the study materials or courseware such as articles, policy documents, manuals, tools and modules in pdf, audio, video form by experts in the field is made available on the either directly or through links.

- Results
  - B. Lib Results
  - M. Lib Results
- FAQ

Frequently asked questions are the listed questions and answers commonly asked in some context pertaining to a particular topic or topics. Rather than an acronym, it is pronounced as 'initialism'. Its pronunciation varies from 'fack', 'faak' 'fax' to 'facts' commonly heard. Depending on the usage, the terms may refer to a single frequently asked question or a group of assembled questions.

This section provides answers to frequently asked questions about e-learning and training, answers about portal usage, course details, admission procedure and other related questions for online delivery of learning and training.

- e-Thesis and Dissertations

This menu provides the link to various online theses web-portals and repositories so as to provide a gateway to vast sources of knowledge from a single access point.

- Site Map

A sitemap is a list of web pages in a website accessible to users. It is either in a document form or a webpage from typically organized in hierarchical fashion. There are two poplar versions of sitemap; XML sitemap and HTML sitemap. Site map gives information about the modules, menus options and links provided in the portal.

- Photo Gallery

This section includes the images and photos of various eminent personalities in library and information science across the world.

- Contact Us

This section includes the query form basically designed for those users who wish to know something about the facilities provided regarding online registration, learning and other things.

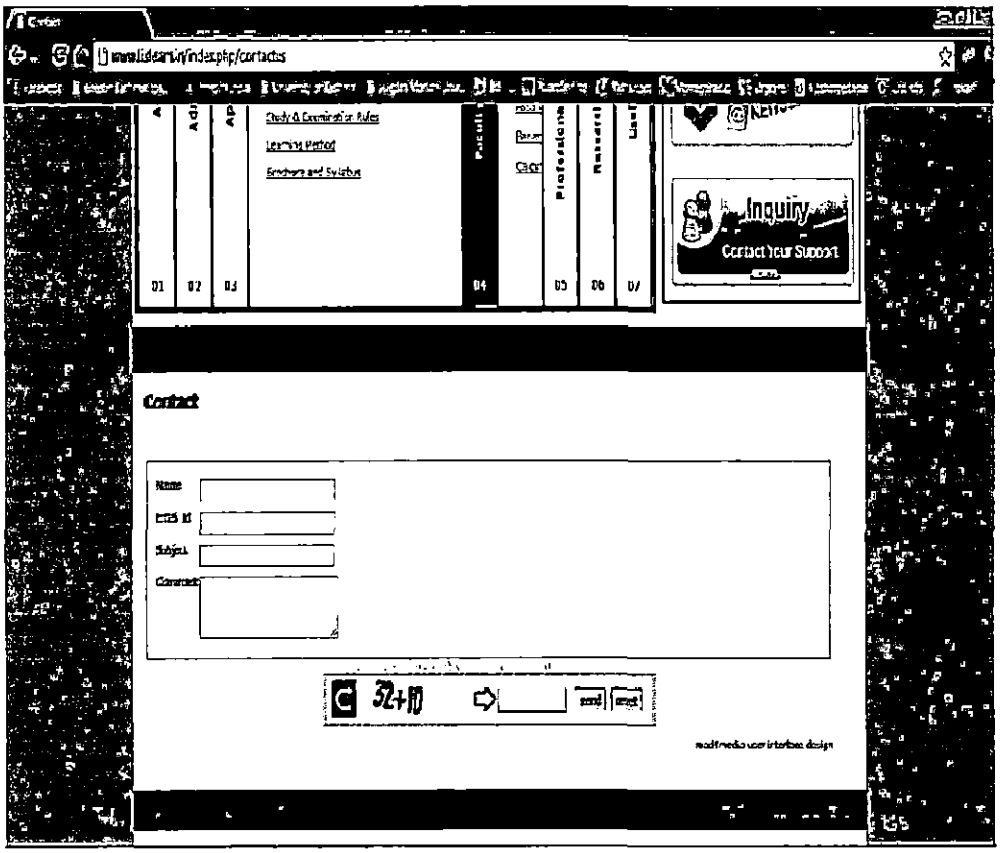


Figure-41 Contact Us

- Newsletter

A newsletter is a regularly distributed publication generally about one main topic that is of interest to the subscribers. Newsletters delivered electronically have gained more acceptances over printed correspondence. General attributes of newsletters include news and upcoming events of the related organization as well as contact information for general inquiries. Any user can subscribe the newsletter facility by just providing his/her name and e-mail address.

6.4.2 Slider Menus

- About Us
    - E-Learning Portal
    - Vision and Mission

- Objectives and Values

This section includes information about Lislearn, its vision and mission along with the objectives on which it is designed and the values that are strictly to be followed.

- Admissions
  - Programs Offered
  - Entry Requirement
  - Fees for All Programs

This section provides information regarding the courses that are offered, the essential requisites for getting admission and the fees for each program to ease up the admission process.

- Applicants
  - Apply Now
  - Study and Examination Rules
  - Learning Method
  - Brochure and Syllabus

This portion on the portal gives information about the examination rules, the methods of learning that will be followed, brochure and syllabus around which the study will follow.

- Faculty Corner
  - Alphabetical list of LIS faculty in India
- Professional corner
  - Professional Development Programs
  - Workshops and Training
  - Conferences and Seminars
  - Symposiums and Debates
- Research Corner
  - M.Phil in LIS

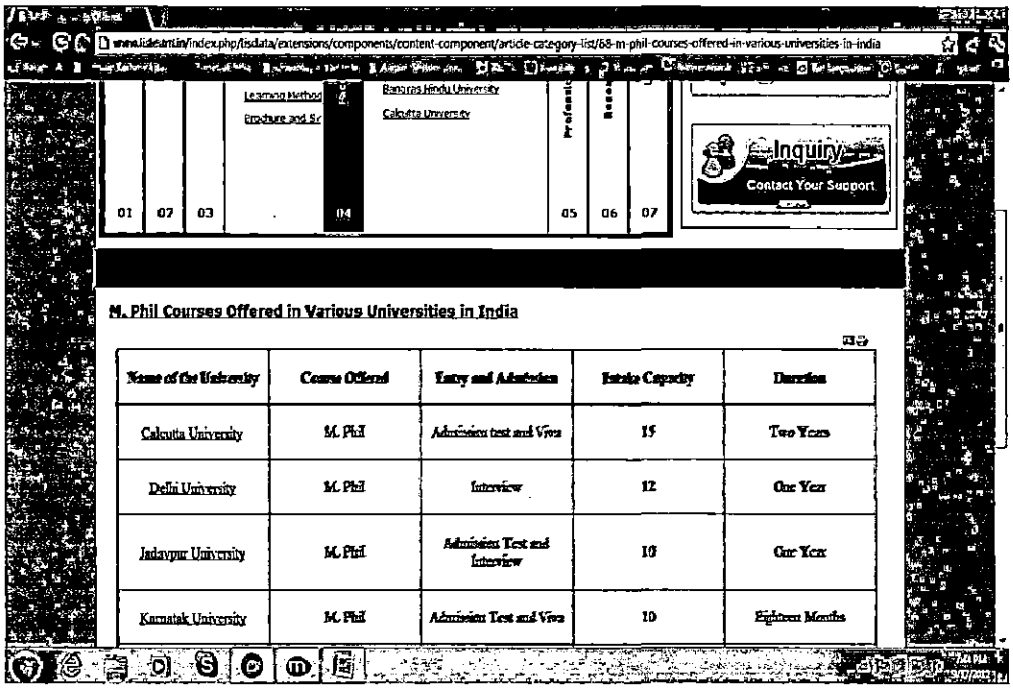


Figure-42 M.Phil Courses in various Universities in India

- Ph.D in LIS

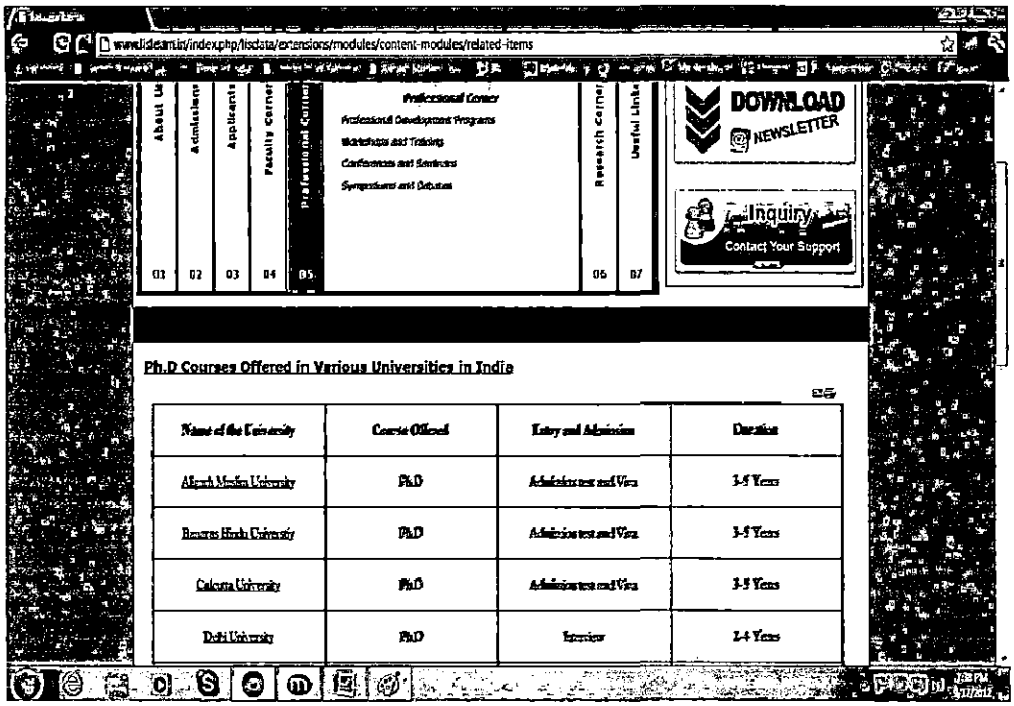


Figure-44 Ph.D Courses in various Universities in India

- Theses Awarded in LIS

This section provides news about research (M.Phil/Ph.D), fellowships, conferences and workshops, theses awarded etc. in LIS in India

- Useful Links
    - SIGIT
    - AMU Blog
    - LIS Gateway
    - LIS Forum
    - Shodhganga

6.4.3 News and Events

It is the communication of the select information on current events presented to mass audience. This section provides the latest updates of news and events in library and information science profession.

6.4.4 Login Form

In computer terminology, login (also known as logging in or on and signing in or on) is the process by which individual gains access to a computer system and is controlled by identifying and authenticating user referring to credentials provided by the user. Users can logoff or logout when the access is no longer needed after having previously logged in. Once the user is logged in, login tokens may be used to track the actions user has taken while connected to the site.

The portal provides three types of login options according to the user types. They are listed as under:

- Login for Students
    - Profile Info
    - Calendar of Events
    - Chat
    - Side bar containing links to forums, discussions and activities.
    - Enter the Classroom
- Login for Teachers
    - Profile Info
    - Calendar of Events
    - Chat
    - Side bar containing links to forums, discussions and activities.

- Deliver Lecture

- Login for Professionals

Users and professionals can register themselves by just filling the user form through which they can become the registered users. Users need to pay to get registered on quarterly, half yearly and yearly basis.

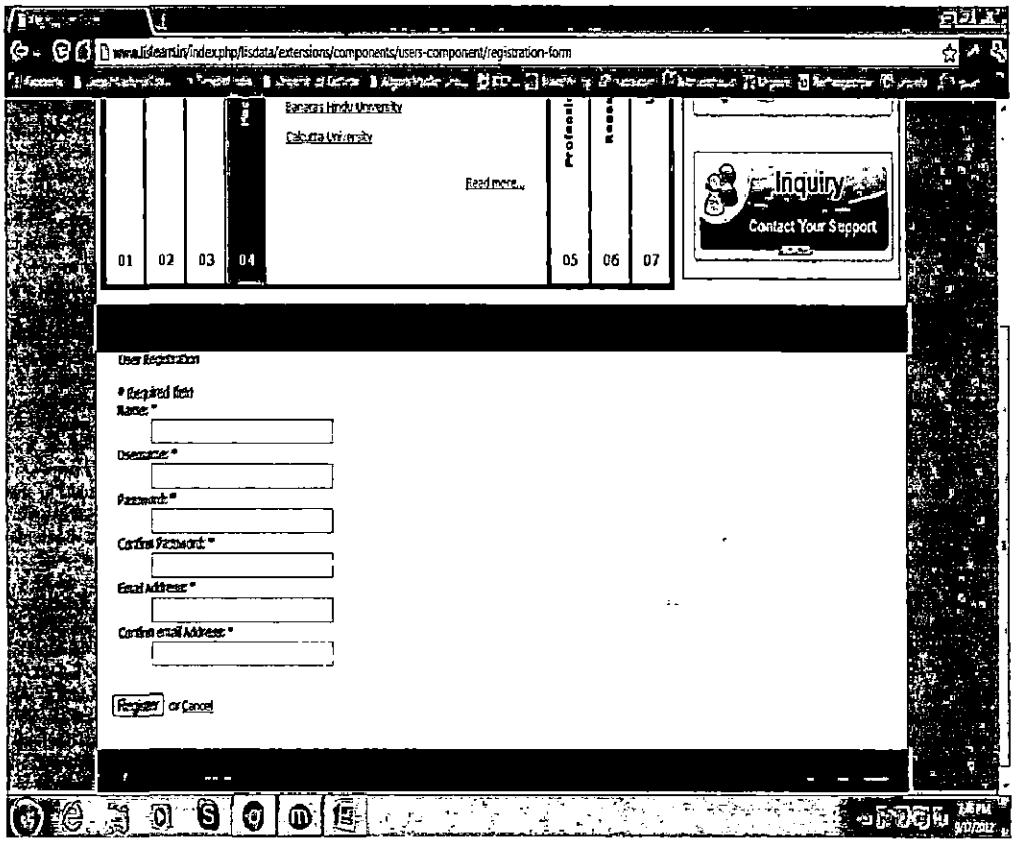


Figure-44 User Registration

6.4.5 Site Search

In a search engine, a web-portal and most of the websites, a search box is provided for searching articles or topics of interest. The results page shows the most relevant topics first and least relevant topics in the end. It saves the browsing time of a user and can directly display the appropriate information what a user is looking for. A search box in the portal is provided at the top for locating and finding information within the site. Any user can search particular world and phrase according to his/her desire.

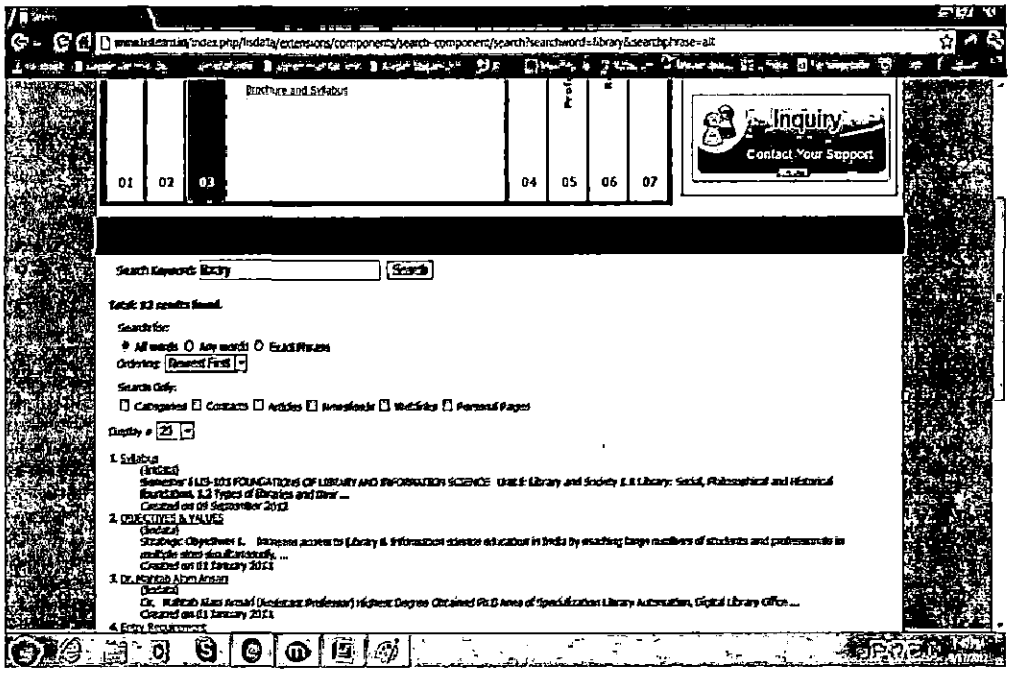


Figure-45 Site Search

6.5 System Analysis for Current Study

A system approach was taken to develop information system which is known as System Development Life Cycle (SDLC). It is a step-by-step process which refers to a methodology for developing systems. It provides a consistent framework of tasks needed to develop systems **(Mishra, 2002)**. The SDLC methodology can be reduced to include only those activities that are appropriate for a particular project, whether the system is automated or manual, whether it is a new system or an enhancement to existing systems.

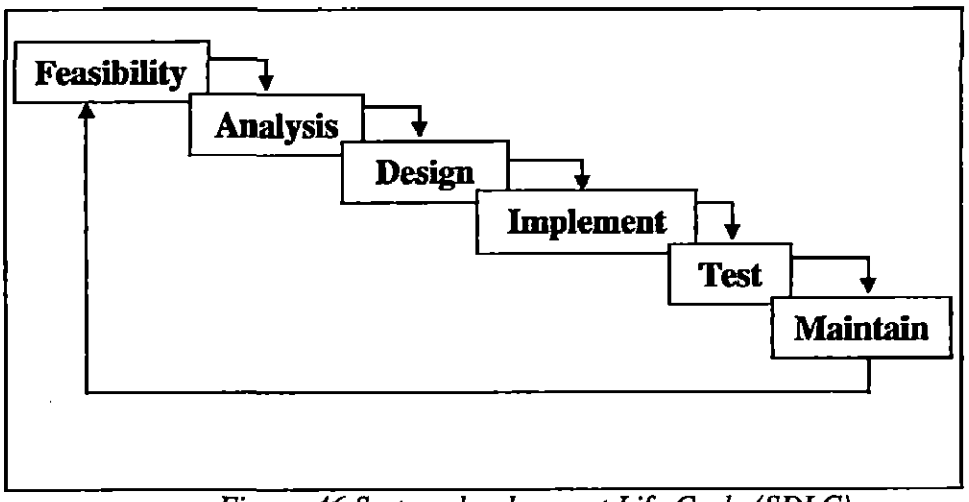


Figure-46 System development Life Cycle (SDLC)

SDLC methodology tracks a project from an idea developed by the user, through a feasibility study, systems analysis and design, programming, pilot testing, implementation, and post-implementation analysis. Documentation developed during the project development is used in future when the system is re-assessed for its continuation, modification, or deletion.

6.5.1 System Development Life Cycle (SDLC)

The System Development Life Cycle (SDLC) is a conceptual model used in project management that describes the stages involved in an information system development project from an initial feasibility study through maintenance of the completed application. Various SDLC methodologies have been developed to guide the processes involved including the waterfall model (the original SDLC method), rapid application development (RAD), joint application development (JAD), the fountain model and the spiral model **(Whitten et al. 2004)**. Several models are combined mostly into some sort of hybrid methodology. Documentation is crucial regardless of the type of model chosen or devised for any application, and is usually done in parallel with the development process. Some methods work better for specific types of projects, but in the final analysis, the most important factor for the success of a project may be how closely a particular plan was followed.

The system development life cycle (SDLC) is the entire process of formal, logical steps taken to develop a software product. The phases of SDLC can vary somewhat but generally include the following:

1. Conceptualization;
2. Requirements and cost/benefits analysis;
3. Detailed specification of the software requirements;
4. Software design;
5. Programming;
6. Testing;
7. User and technical training;
8. And finally, maintenance.

6.5.2 Brief Description of Different Phases

(a) Feasibility

Feasibility study is used to determine whether a project is worth doing and should go ahead. Feasibility studies are undertaken under tight and fixed time constraints and normally culminate in a written and oral feasibility report. The author has taken two weeks to study feasibility study with the co-developer. The contents and recommendations of this study helped as a sound basis for deciding how to proceed for system development. It helped in taking important decisions in deciding the software and hardware combinations etc. to be used. A set of alternatives and their feasibility is also considered in case of any failure in the proposed system. Thus, feasibility study is an important part in software development.

There are three main phase of feasibility study:

(i) Technical Feasibility

Technical feasibility determines whether the work can be done with the existing equipments, software technology and expertise at hands. It is concerned with specifying tools, instrumentation and software that will satisfy user requirements. It checks whether the available hardware and software resources meet the established requirements of the analyzed system. It also invokes the study of new alternative to solve the given problem.

(ii) Economical Feasibility

Economic feasibility determines the cost effectiveness and cost benefits of the system. It establishes the return on investment (ROI) and signifies savings in terms of monitory gains and the level of user satisfaction regarding its pre-assumed cost for developing a system. During the economical feasibility test, a balance was maintained between the operational and economic feasibilities as the two were conflicting. For example the solution that provides the best operational impact for the end-users may also be the most expensive and, therefore, the least economically feasible. The genuine consideration of the system developed is the approach the author followed to look the system in the way it is useful for the end users.

(iii) Operational Feasibility

Operational feasibility criteria measure the urgency of the problem (survey and study phases) or the acceptability of a solution (selection, acquisition and design phases). People are inherently resistant to change, and computers have known to facilitate change. An estimate should be made of how strong a reaction the user staff is likely to have towards the development of a computerized system. It is common knowledge that computer installations have something to do with turnover, restraining, transfers, and changes in employee job status. Therefore, it is understandable that the introduction of a candidate system requires special effort to educate, sell and train the staff on new ways of delivering knowledge.

(b) Requirement Analysis and Design

This stage includes a detailed study of the needs and objectives of the organization. During these phases, the software's overall structure is defined. Analysis and Design processes are very crucial in the whole development cycle. Any glitch or anomaly in the design phase could be very expensive to solve in the later stage of the software development. Much care is taken during this phase. The logical system of the product is developed in this phase.

(c) Coding and Implementation

Coding and implementation requires high level of expertise. In this phase, the designs are translated into codes understood by the computers. Computer programs are written using a conventional programming language or an application generator. Programming tools like Compilers, Interpreters, and Debuggers are used to generate the code. Different high level programming languages like C, C++, Pascal, and Java are used for coding. With respect to the type of application, the right programming language is chosen.

(d) Testing

In this phase, the programs are written as a series of individual modules, subject to separate and detailed test. The system is then tested as a whole by bringing together the separate modules as a complete system. The system is tested to ensure that the links and interfaces between modules work (integration

testing), the system works on the intended platform with the expected volume of data (volume testing) and the system does what the users require (beta testing).

(e) Maintenance

Inevitably, the system needs maintenance on regular basis. Software needs to undergo upgradation or updation in order to incorporate new features. System needs to be checks for bugs and errors. Unwanted cookies and files needs to be deleted in order to regulate the speed of the site loading and browsing. No or less used modules, options or links need to be deleted and latest trends to be incorporated.

(f) Time Scheduling

Management tools such as PERT, CPM, Gantt charts, work breakdown structures and personnel staffing charts may be used to track and control progress. Basic planning uses bar chart that shows system activation and amount of time it will take. The Gantt chart uses horizontal bars to show the duration of actions and tasks. The left end marks the beginning of the task, the right end its finish. Time is projected in days.

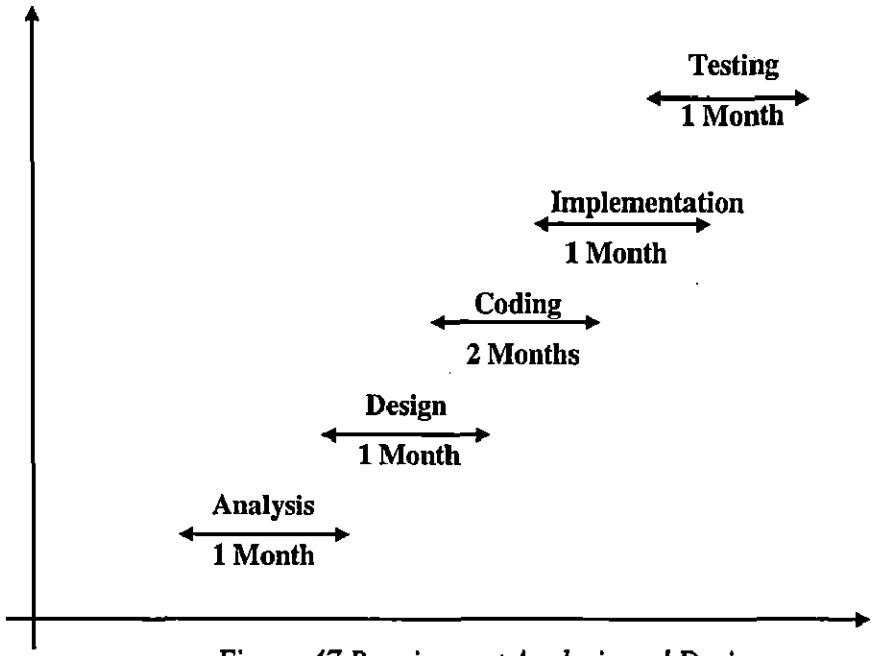


Figure-47 Requirement Analysis and Design

The heavy horizontal bars are activities and the light horizontal bars are tasks. Broken horizontal bars are estimated time delays or slack time.

6.5.3 Process and Dataflow Diagrams for System Analysis

(a) Process Diagram

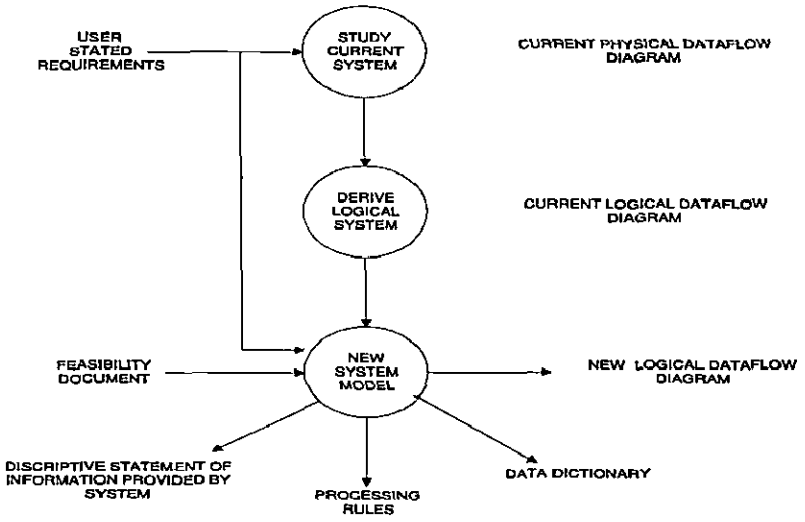


Figure-48 Process Diagram for System Analysis

(b) Query Form

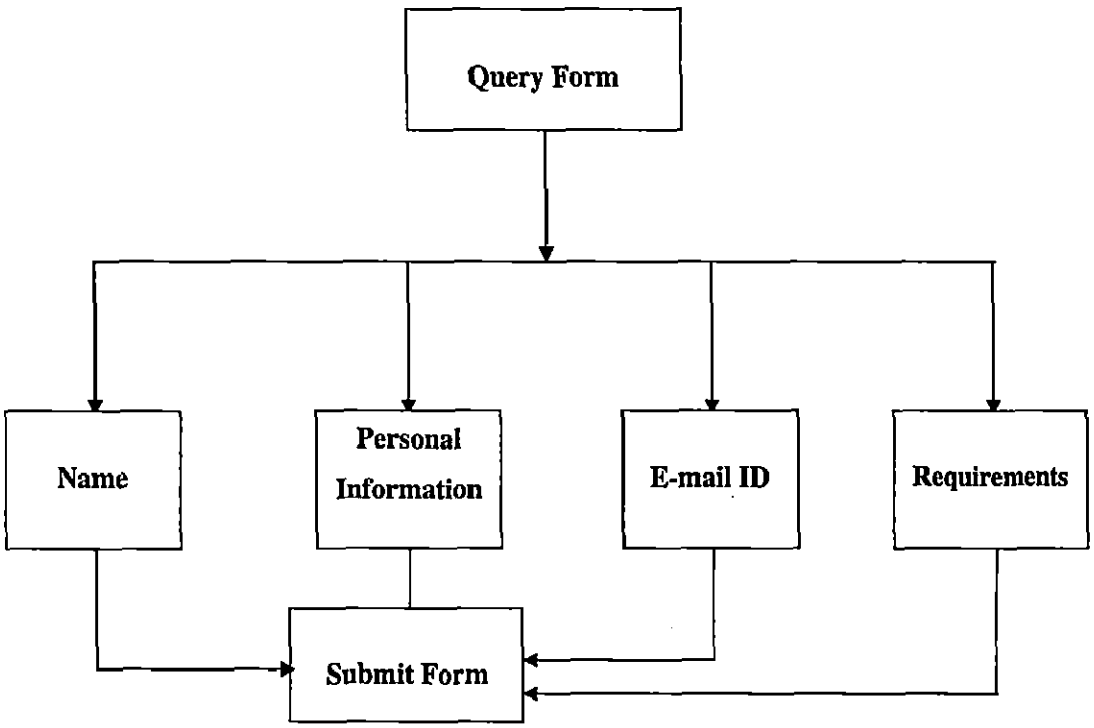


Figure-49 Query Form

(c) User Registration

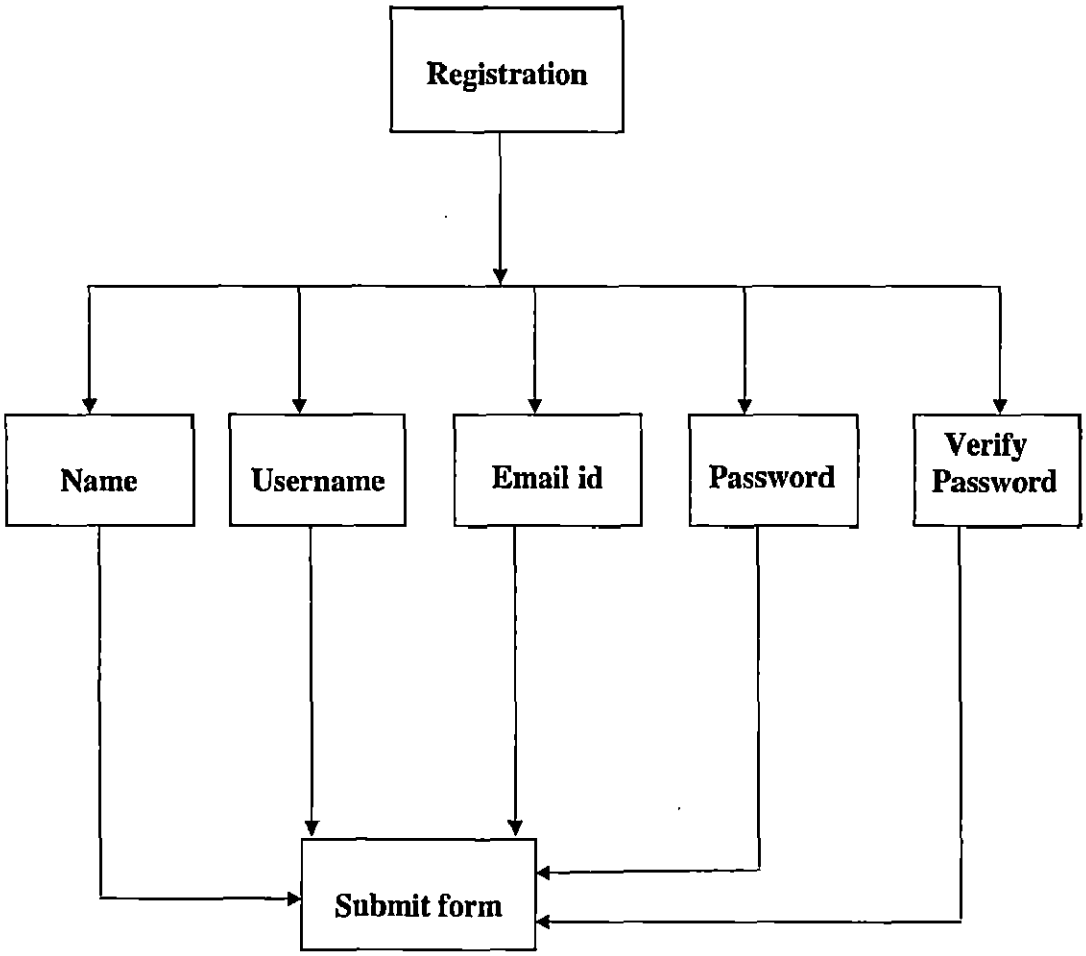


Figure- 50 User Registration

(d) Login to Website as a Registered User

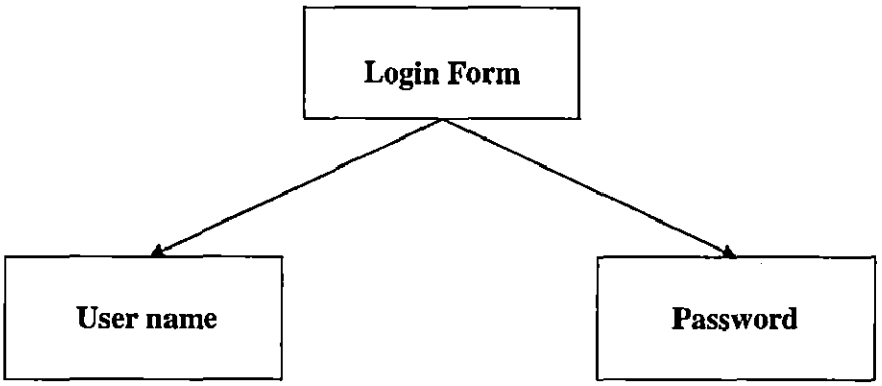


Figure-51 Login to website as a registered user

(e) If forget password

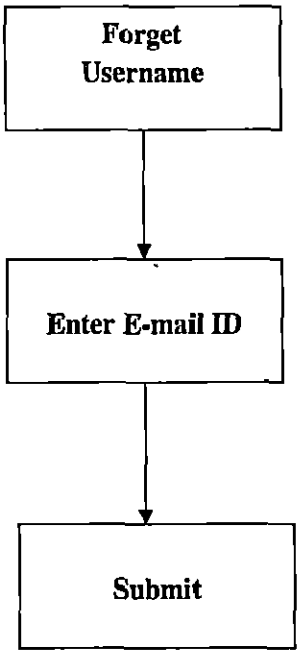


Figure -52 Forgot Password

(f) News letter

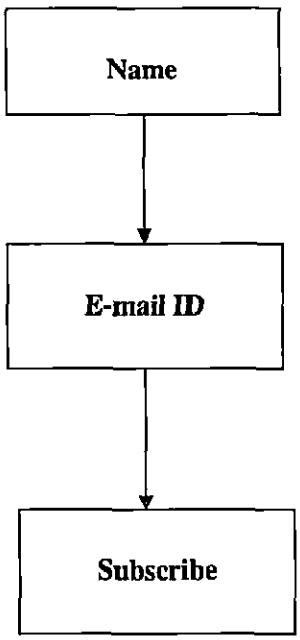


Figure- 53 Newsletter

6.6 System Testing

System testing is the expensive and time-consuming process. There are two strategies for testing software that we use for testing our system: Code Testing and Specification Testing. In Code testing, we developed those cases to execute every instructions and path in the program. In specification testing, we examined the program specification and then wrote test data to determine how the program operates under specified condition. The different levels of testing are used in the testing process. The basic levels are unit testing, integration testing, system testing, and acceptance testing. These different levels of testing detect different types of faults.

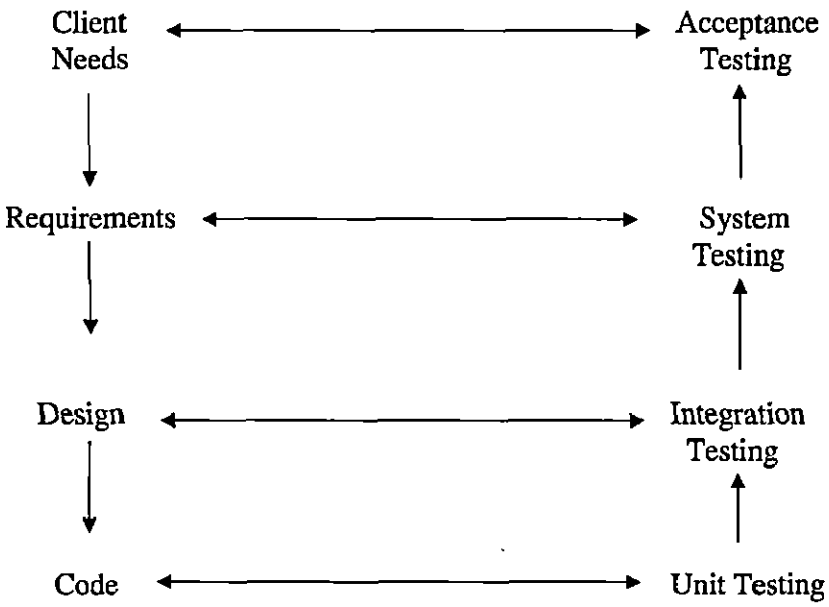


Figure- 54 System Testing

6.6.1 Levels of testing

We have tested each module separately i.e. have completed unit testing first and system testing was done after combining /linking all different Modules with different menus and thorough testing was done. Testing is a very important part of SDLC and takes approximately 50% of the time. Once the system is a live one, maintenance phase is important. Service after specified time is a must and users/learners must be helped after the system is

implemented. If he/she faces any problem in using the system, one or two trained persons from developer's side can be deputed at the client's site, so as to avoid any problem and if any problem occurs, immediate solution may be provided.

The following are some attributes of a good test:

- A good test has a high probability of finding an error. To achieve this goal the tester must understand the software and attempt to develop a mental picture of how the software may fail. Ideally the classes of failure are probed.
- A good test is not redundant: testing time and resources are limited. There is no point in conducting the test that has the same purpose as another test. Every test should have a different purpose.
- A good test should be best of breed. In a group of tests that have a similar intent time and resource limitations may militate for the execution of only a subset of these tests. In such cases the tester that has the highest likelihood of uncovering a whole class of errors should be used.
- A good test should be neither too simple nor too complex: although it is sometimes possible to combine a series of tests into one test case, the possible side effects associated with this approach may mask errors. In general each test should be executed separately.

6.7 Discussion and Future Scope

It can be concluded that LISLearn can be very much beneficial for the academic point of view. It can help Library and Information Science schools who want to promote their institute through online mode of learning and teaching.

The future prospect of the web portal involves contributing content and learning to various academic institutions using membership options. It will also take into the consideration that many more academic prospects could be attached to the web portal that will help the learners to find multiple learning options in a single interface easily using the web portal to help them in increasing their knowledge about their topics of interest.

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Chapter-7

Summary, Findings and Conclusion

CHAPTER- 7

SUMMARY, FINDINGS AND CONCLUSION

7.1 Summary

The purpose of this study is to develop an e-learning prototype, based on open access software JOOMLA, after examining and understanding various current e-learning systems for online delivery of education. With the advent of online instruction, it had become reasonably clear that modifications to traditional instructional design methods to suit the unique conditions of online environment were needed.

The present study is undertaken with the intent to design and develop an architectural and instructional delivery system to expand the possibilities of improving professional caliber and quality of education in Library and Information Science. Furthermore, the research study also investigated the knowledge and expertise in e-learning of Library and Information Science faculty members from the select universities across India. Moreover, the study has a purpose to investigate the effectiveness of softwares and e-learning delivery systems of select universities, their services and operations for delivering online instruction.

For the purpose of investigating the knowledge and views of Library and Information Science faculty members regarding the same, stratified sampling wad done and the investigator selected oldest and top ranking twenty universities across India having adequate infrastructure to support e-learning system and substantial faculty, which are offering education in this field of knowledge.

The investigator also selected eight other universities for investigation which provide e-learning in Library and Information Science and Management fields in India. After a thorough review of the related literature, a set of two well designed questionnaires are administered among the faculty members, online instructors and students under study. The survey results in 77.7%, 81.25% and

87.5% response respectively from faculty members, proficient staff members and students. In addition to collection of data, the investigator consulted various printed and electronic resources such as annual reports; pamphlets; brochures; newsletters; websites; etc. to cross-check the validity and authenticity of data provided by the respondents.

The collected data is analyzed and coded in MS-Excel package. Subsequently, the Chi-Square statistical test is used to prove the significant difference in the data. Besides above, graphs; charts; diagrams and Cross tabulation are used as per the need to measure the relationship between variables. Based on the data obtained from the users of libraries under study, following major findings are deduced.

7.2 Findings

The data is obtained through survey method by distributing a set of two well designed questionnaires among the Library and Information Science faculty members and instructors and students of the surveyed universities. On the basis of analysis of collected data with respect to "Design and Development of E-Learning Solutions in Library and Information Science", some of the major findings to enhance the efficiency and effectiveness of delivering online instruction and their operations and services are summed up as follows:

1. As higher education attempts to improve the products it provides, continued care and attention are needed in the area of instructional competence. As institutions continue to grow their online course offerings, an increasing number of faculty members will be called to teach online; many for the very first time. Failing to adequately support faculty could result in undesirable outcomes; low student satisfaction with online experiences linked to retention/attrition issues. The investigator has found that majority of the faculty members have ample knowledge about computers, internet and e-learning (Table-2 and Table-3). However, none of them ascribed that they have excellent knowledge about e-learning. There is a point of concern about the average knowledge of most of the faculty members which needs to be improved

over time so as to understand all pros and cons of the e-learning system and to effectively deliver as per the student's expectations.

2. The teaching faculty is ready to accept and implement technology for the ease of delivering and adopt new and modern ways to cope with the shift and makeover of education system in India. It has been extremely important to incorporate and implement e-learning systems in Library and Information Science education in India (Table-7). Due to the changing trends in methods of teaching and ways of delivering, nearly all of the faculty members from the select universities in India are of the opinion that it is extremely important to implement e-learning systems in Library and Information Science education in India. On the other hand, various faculty members have got sufficient exposure in the field of Information Technology and are ready to accept challenges in IT environment. It is because of this reason the same amount of enthusiasm has been found among the faculty members to deliver education and instructions online.
3. E-learning has only been included as a holdup, not as an alternative or substitutes to traditional learning and is not considered as essential for the success of organization in India (Table-25). Since the success of the organization is measured in terms of the number of students, courses offered, page hits, infrastructure, quality and depth of the teaching and the total results as research output, but none of the institutes in India is entirely delivering online education, e-learning is still at the periphery and none of the organizations is completely dependent on e-learning for its success.
4. There is slow and poor internet connectivity and inadequate infrastructure facilities in various universities in India which leads to many problems in applying e-learning resources in their departments (Table-38 and Table-40). This could be mainly due to the lack of proper financial assistance which plays a major role in building up the infrastructure and adding resources to the learning instructional system.

E-learning resources largely includes asynchronous, web-based instructional content in the form of html tutorials, online databases, institutional repositories, interactive video, flash animations, screen captured presentations, and the like. The use of these resources depends mostly on the internet accessibility and the digital equipments available in the organization.

5. The study shows that the private universities are far ahead in implementing the innovative technologies efficiently with maximum user satisfaction than the government universities and institutions in India (Table-49). The private and open universities have a tough competition to survive and are adapting latest technologies in teaching and learning in order to expand the scope of the subject education.
6. Application of e-learning causes to weaken the student-teacher relationship. The interpersonal relationship between students and teacher is an important element contributing to the learning process of students (Table-36). In e-learning, we can find only mentorship which is a one-on-one learning relationship between a student and an expert in a specific topic or discipline for the purpose of supporting learning and development. Students and mentors can suitably and more frequently communicate with each other through words, pictures, and other information regardless of location or schedules. But the relationship weakens because of the low teacher discourse, the practical sense of feelings and expressions during face-to-face instruction and dealing with the problems and differences of the individual students.
7. E-learning is not fulfilling all of the learning needs of students. It is because the practical aspect of teaching and learning (hands on practice) is lacking in online mode of instruction and the lack of face-to-face interaction could be one of the problems. The material is complex enough to understand and learn which in turn affects the students who are not quick to understand and are week in structural setup of content (Table-37). Besides the above stated complexities, various problems

associated with e-learning is the design by technologists which is often very complex and requires strong input from pedagogues in terms of content and learning process flow. The second main thing is that the learning is not build on the prior knowledge of learner and it can be the waste of time. The third thing is that an LCMS platform needs to be robust and stable at all times and any weaknesses in it can cause trouble and poor motivation among learners. Last but not the least; poor learner support can result in poor attendance to the programs as they are left to their own devices which can result in lack of interest.

8. Motivation is a determining factor to keep students associated continuously with online learning throughout the course. Motivation of students in online courses is a challenging task. It is difficult to keep students motivated throughout the course because of the varying requirements of students, the type of students and their study habits that vary from student to student. It is found that there must be a timeline to check the progress of students and opportunities to redo an assignment must be devised in order to keep students motivated throughout the course (Table-16 and Table-41). However, providing immediate responses and instant feedback also can engage students to a fair extent and reduces the chances of anonymity feelings that can result in student's withdrawal from the course.
9. Application of e-learning system would not replace or substitute the traditional classroom teaching and learning. Since, e-learning is nowadays considered as the alternative to the traditional classroom learning because of the benefits which it promises to offer, but e-learning cannot replace traditional classroom learning in the near future (Table-18 and Table-35). The reason behind this is that majority of the people are not well aware about the e-learning technology. Most of the students fail to purchase high cost digital equipments and in the developing countries, it is like a dream for poor to possess any such tools. Also, there is a lack of expertise and internet connectivity in the

developing countries which is a great setback to e-learning. The social interaction, practical learning skills development, interactive classroom settings, encouragement, exchange of ideas without communication barriers are missing in e-learning and can only be achieved in traditional learning.

10. Open source softwares are considered more efficient for design and development of an e-learning system (Table-8). The whole infrastructure is dependent on the type of softwares handling the system. Due to the availability of source code, organizations can architect and scheme the software as per their requirements with some modifications and make it more efficient, which cannot be achieved in proprietary or commercial softwares. This depicts the mounting influence of open source softwares and their rising impact in growing e-learning market.
11. Social networking is seen as a guided didactic communication for the development of autonomy among students (Table-31). The communication must all be present during the course on a personalized form (for the students to feel motivated). Communication between the teacher and students plays a pivotal role for effective knowledge transfer. The modes of communication depend on the capability of the system to handle such means and vary from system to system, depending on the efficiency of handling multi-dimensional approaches of communication. It is found that in a modern web milieu, social networking is an essential component in disguise in virtual learning environment.
12. Multiple-choice tests are the best strategies for the assessment of students on online courses. Drafting multiple-choice tests and assigning projects are the easiest ways of conducting tests in an online instruction (Table-33). They are the best ways to formative, summative, evaluative and educative assessments from providing diagnostic feedback to students and instructors; description of students' level attainment, curricular feedback to building students (and faculty) insight and

understandings about their own learning and teaching. It is considered as the most effective way of assessment as it is readily scorable by a variety of electronic means and offers some striking features as an assessment format. However, it is found that multiple-choice tests encourage poor attitude towards learning and to overcome that problem, multiple choice tests are often accompanied by short answer type assessments and thus the incorrect influence of multiple-choice tests is minimized in this way.

13. Internet is considered most reliable enough to provide 24x7 learning without any debate than the other offline asynchronous formats, whereby the learning and teaching is done by providing CD-ROMs, bulletins and e-mails etc (Table-17). Students have access to multimedia learning resources including case studies, revision materials, assessments, and peer discussions - all through the internet. It is mostly because of the fact that on internet, students as well as teachers can access millions of resources within no time and can save the time in searching for the printed documents lying in the libraries, wherever possible.
14. Most of the organizations and institutions prefer to develop a portal or a website using software which is easy-to-use and contracted to a vendor because of the lack of technical staff and expertise in handling of the software. At times, if an organization or a particular department or faculty of the institution is having enough software technical expertise, then they prefer to have an in-house developed e-learning system which can be designed, upgraded and even modified as per their needs and requirements from time to time.
15. Students are not satisfied with the content delivery speed of learning (Table-34). Today, when change is faster than ever, a key advantage of e-learning is that it has faster delivery times than traditional classroom based instruction. Rapid prototyping or rapid e-learning using various authoring tools is one approach to the development of learning content

that has experienced exponential growth. However, due to the lack of proper infrastructure for learning content delivery and real-time video-conferencing system, learners feel discontented with the system. This time lag in developing and delivering of learning has resulted in poor learner's response and satisfaction and thus in turn affected their performance.

16. Joomla is the most preferred content management system followed by MOODLE and ILIAS. It is because of the fact that although Moodle is open source software but requires an IT specialist to handle it but Joomla is a kind of software which is easy-to-learn and handle (Table-49). Choosing any Content Management or Learning Management software is not always easy and requires lot of expertise. Main criteria for choosing any authoring tool depends on some of the attributes like accessibility, compatibility, maintainability and usability. There is no need to hire any IT specialist and there have been many discussions and complaints about the Moodle interface. For any problems with Moodle, there isn't any helpdesk and one has to look for solutions on forums which are the only support option while as Joomla has a guaranteed helpdesk for support which makes Joomla the preferred one over other authoring tools.
17. Website based systems have been a powerful impression to develop anything online, be it a learning or any commercial work and are considered the most versatile solution for delivering online learning followed by web portals (Table-9). The reason is quite apparent because of the fact that portals are of recent origin and the staff members are well versed with the designing and use of websites throughout these years. A sudden shift is not possible but the use of web-portals is gradually increasing because of the secure, easy-to-design and easy-to-use features. None of the university is using e-mail or dial-up based e-learning systems but emails are being used as an integrated part of the portal or website-based systems.

18. Providing detailed syllabus, user friendly menus, better communication tools, threaded discussions and interactive activities are some of the main features in all the delivering systems, which ensures motivation among students and success of the overall learning instruction (Table-21). However, social networking features are absent in most of the e-learning systems and there is a complete disagreement in displaying the status reports of student's progress in a forum or message boards.
19. None of the e-learning delivering systems from the select universities allow students to easily communicate with other students and does not involve students in reviewing the work of other students online (Table-47).

7.3 Tenability of Hypotheses

The tenability of hypotheses is verified in the light of above discussed findings and by using Chi-Square statistical test.

1. There is adequate infrastructure and expertise available in all the universities under study for providing e-learning.

Sufficient infrastructure in an e-learning system and professional development of staff members plays an important role in practicing learning and teaching process in electronic environment. It is clear from the findings (Table-38 and Table-40) that lack of adequate infrastructure is considered as one of the major obstacles by 53.58% of the students and only by 34.61% of proficient staff members. It is followed by lack of expertise by 25.60% of students and by 51.92% of faculty members.

The Hypothesis is therefore Rejected

2. There is no significant difference in the opinions of e-learning proficient staff and students with regard to weakening of student-faculty relationship in e-learning environment.

The interpersonal relationship between students and teacher is an important element contributing to the learning process of students. In e-learning, one can find only mentorship which is a one-on-one learning relationship between a student and an expert in a specific topic or discipline for the purpose of

supporting learning and development. Students and mentors can suitably and more frequently communicate with each other through words, pictures, and other information regardless of location or schedules. From Table-36, it is evident that 77.51% of students believe that e-learning would weaken the student-teacher relationship. However, 63.46% of proficient staff members disagree with the statement

On applying the Chi-Square test, it is found that the calculated Chi-Square value (13.6) is quite large than the Chi-Square tabulated value (5.991) with 2 degrees of freedom at 5% level of significance. The Chi-Square test, therefore, reveals that there is a significant difference in the opinions of e-learning proficient staff and students with regard to weakening of student-faculty relationship in e-learning environment.

Hence, Null Hypothesis stands Rejected

3. There is no significant difference among faculty members with regard to the apprehension due to adoption of e-learning for delivering education.

The impact of information in all spheres of society coupled with the utilization of IT development for access and utilization of information are dramatically changing the face of the library and information institutions.

Talbe-7 depicts that (100%) of the faculty members responded that it is extremely important to implement e-learning system in Library and Information Science education in India. All these figures depict that the there is no apprehension or hesitance among teaching faculty to accept and implement technology for the ease of delivering and adopt new and modern ways to cope with the shift and makeover of education system in India.

Hence, Null Hypothesis stands Rejected

4. Private universities are far ahead in delivering online instructions efficiently with innovative technologies than the government universities and institutions in India.

The study shows that the open and private universities are far ahead in delivering online instructions efficiently with maximum user satisfaction than the government universities and institutions in India. Table-49 clearly depicts

from the evaluation of the web portals of the select government and private universities that the private and open universities have a tough competition to survive and are adapting innovative technologies in teaching and learning in order to expand the scope of the subject education. However, most of the essential components of e-learning systems such as web 2.0 items, overview of the courses, additional references, standards compliance, open source LCMS etc. are missing in the government universities.

The Hypothesis is therefore Accepted

5. Students are more satisfied with the content delivery speed of e-learning mode of teaching than the proficient staff members.

Rapid prototyping or rapid e-learning using various authoring tools is one approach to the development of learning content that has experienced exponential growth. Today, when change is faster than ever, a key advantage of e-learning is that it has faster delivery times than traditional classroom based instruction. The data from Table-34 depicts that 69.23% of the proficient staff members are satisfied with the delivering speed of their online instruction. However, 30.77% of the proficient staff members and 79.43% of students seems to be dissatisfied because of the lack of proper infrastructure for learning content delivery and real-time video-conferencing system.

On applying the Chi-Square test, it is found that the calculated Chi-Square value (57) is higher than the Chi-Square tabulated value (3.841) with 1 degree of freedom at 5% level of significance. The Chi-Square test, therefore, reveals that there is a significant difference among proficient staff and students with regard to the content delivery speed in online delivery of education.

The Hypothesis is therefore Rejected

7.4 Conclusion

Technology has and will perhaps continue to have a dramatic impact on academic and educational setup of the world. It is considered as the main force today for changing the scenario of world education in general and India in particular. In order to satisfy the growing needs and requirements, e-learning is the best solution and alternative to traditional teaching and learning.

The purpose of adopting e-learning system should be to increase return on investments, reduce travel costs, assist workforce planning and to deliver content without having to sacrifice quality. By creating online classes and making them readily available to learners, customized learning systems will increase the overall institutional and organizational productivity. Presently, a large number of universities and educational institutions are in a state of adopting and implementing integrated e-learning systems in their educational setup for improving and extending their reach on education. But for doing so, they need to improve from current position of e-learning institutes to fully operational and self sufficient systems to handle this mode of learning effectively and efficiently. Therefore, the implications of studies for technological changes and improvements in academic institutes, especially Library and Information Science are of good value to authorities for implementing effective and successful e-learning system.

The present study reveals the position and perspectives of faculty members, e-learning proficient staff members as well as students of the select universities and the areas where there are more chances of improvement. Its findings may suggest new dimensions and directions in providing efficient and effective access to online resources through modern and standard learning methods. The report of these findings could also be used as a roadmap for implementing successful integrated online learning system to meet the expectations of modern and techno-oriented learners. E-learning environments are expected now, more than ever, to deploy and manage learning content that can be easily searched and retrieved during an auto-learning phase as well as to be reused for different educational purposes. With e-learning environment learners are allowed to easily locate and access the content of their preference. This study demonstrates that institutions are, in fact, taking steps to provide services to assist faculty with entering the realm on teaching online. The findings may guide the performance improvement process as well as provide a template for organizations to move forward with identifying key pieces to prepare faculty to deliver the program.

It is hoped that the present doctoral thesis on "Design and Development of E-Learning Solutions in Library and Information Science" will gather interest to help e-learning analysts both at State as well as at National level for implementing successful integrated e-learning system. The findings resulted from this thesis are based on the data provided by the faculty members, e-learning proficient staff and students of the select universities in India. Notably, the findings and suggestions of this study perhaps represent the national consensus needing attention and support to solve the issues that are associated with the implementation of successful e-learning system in the academic institutions of India, especially LIS schools. But, this study should not be deemed as the only viable way out to solve all the problems related to online learning in India. However, it will serve as a guide for the LIS faculty members and information analysts to select the most appropriate design for the development of an efficient e-learning system that will serve to the needs of a Library and Information Science professionals and learners in a better and effective way.

7.5 Suggestions

On the basis of findings of the study undertaken, the following suggestions are listed for the surveyed universities in particular and for other institutions in general in order to successfully implement e-learning system.

1. Library and Information Science faculty members must improve their practical knowledge and competence in e-learning and use of internet and computers, so that they may find it convenient to shift over a new system of teaching and learning which is going to implement in majority of the Indian universities sooner than expected. They must exert their potential to find new and improved techniques other than traditional ones to be incorporated in online mode of learning which will result in getting the fair value of providing learning than cost.
2. E-learning is not considered as an alternative or substitute to traditional learning and is not considered as essential for the success of organization in India. Infact, blended learning, a combination of both

traditional and online learning, is considered as the best solution to tackle with modern day technological improvements in educational setup. However, Library and Information Science faculty members should try to get the best of both methods of teaching and learning and should help students to get acquainted with the latest technology so that they may not find any difficulty in completely shifting over to an online mode of teaching and learning.

3. E-learning largely depends on the digital equipments and internet connectivity. Any inadequacy in proper infrastructure and poor internet connectivity can result in the failure of the system. Building up of proper infrastructure should be the top most priority.
4. The social interaction, practical learning skills development, interactive classroom settings, encouragement, exchange of ideas without communication barriers must be incorporated in an e-learning delivery system.
5. The four main components of e-learning are the system quality, information quality, the service quality and the user satisfaction. All these components should be taken care of because deficiency in any of the components will result in the lack of interest among students.
6. A continuous and uninterrupted financial and technical support should be provided to organizations and institutions for the successful implementation of an e-learning system with well set modern educational policies.
7. The whole infrastructure of e-learning is dependent on the type of softwares handling the system. While choosing the software, it is suggested to select the software which is not complex and difficult to handle. It must have provisions to add, delete, modify or alter any module that is not required or needs to be incorporated in it. The human computer interface should be user-friendly and easy to handle.

8. Proper technical and learner support with instant feedback and effective communication should be provided in order to keep students motivated throughout the course.
9. Online discussions and webinars and continuous assessments should be conducted and encouraged so that the students will find space apart from their daily routine work which keeps students interested and active.
10. The time lag in rapid developing and delivering learning has resulted in poor learner's response and satisfaction and thus in turn affected their performance. There should be speedy prototyping or rapid e-learning using various authoring tools which is one approach to the development of learning content that has experienced exponential growth.
11. Detailed syllabus, user friendly menus, better communication tools, threaded discussions and interactive activities, forums and message boards should be incorporated in all e-learning delivering systems.
12. Students should be allowed to communicate with each other in the context of learning using group messaging or e-mails within the system over which administrators shall have full authority and control.
13. Students should also be allowed to communicate with teachers and faculty members easily as and when required.
14. Apart from delivering lectures and providing learning, students should be allowed to download audio/video and textual content and other learning resources. This feature needs to be incorporated in all the surveyed universities.
15. New recruitments should be done keeping in view the proficiency in handling the computer and web based e-learning systems.

7.6 Scope for further research

The instructional design methodology for the e-learning development involves five main phases which are analysis, design, development, implementation and evaluation. During the course of this research study, the investigator felt that following future work can be carried out in various other fields of knowledge.

1. Research is needed on the diverse technologies, especially the use of blogs, Wikis, shared documents, social bookmarking, RSS feeds, digital story-telling tools, search tools and expert locators. In particular, the tools that will be most successful and most readily used in creating and in finding knowledge within the organization.
2. Development of the e-learning content involves the use of multimedia packages and web based technologies. So, there is a need for the identification of multimedia and web based packages for the development of e-learning content in order to have a single platform for various subjects of knowledge. The learning objects will be developed accordingly based on the design of the e-learning content.
3. In order to store e-learning contents in a repository so as to facilitate sharing and reusing of the learning contents, design and development of e-learning content repository is essential. This will involve the understanding of XML and its technologies for easy storing and retrieval of documents.
4. Similar studies can be carried out for IITs and IIMs which are well reputed institutes in India.
5. A comparative and evaluative study is also suggested for the universities providing e-learning in India for other fields of knowledge, especially for the government institutions which are a step behind the private institutions in delivering online learning.
6. Similar studies can also be carried out for other large number of universities and LIS schools providing Library and Information Science education in India so as to facilitate, extend and improve the quality of LIS education.

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Appendices

APPENDIX – I

Department of Library and Information Science
Aligarh Muslim University
Aligarh-202002
(Questionnaire for Faculty Members)

Respected Faculty Members,

I am a doctoral student in Library and Information Science under the propitious supervision of *Dr. Naushad Ali P.M., Chairman DLIS, AMU* and I am currently working on my dissertation entitled ***"Design and Development of E-Learning Solutions in Library and Information Science."*** I am conducting this study to better understand how to improve online instruction and the necessary components to be incorporated in the designing of an E-Learning System. This will entail your completion of the questionnaire which is expected to take 5-10 minutes to complete. Your participation is solicited and your information will be kept highly confidential.

Sincerely,

Sheikh Mohd Imran
Research Scholar
Library and Information Science
Aligarh Muslim University
E-mail: bilalgreen1@gmail.com

Name: _____

Organization: _____

Gender: [ ] Male [ ] Female

Qualification: [ ] Graduate [ ] Post Graduate [ ] M. Phil [ ] Ph.D

Specialization (If any): _____

Current Position: _____

Contact Number (Optional): _____

Section-I

1. Your knowledge about Computers and Internet:

   (a) Excellent [ ] (b) Very Good [ ] (c) Good [ ]

   (d) Average [ ] (e) Poor [ ]

2. You rate your awareness and knowledge about e-learning:

   (a) Excellent [ ] (b) Very Good [ ] (c) Good [ ]

   (d) Average [ ] (e) Poor [ ]

3. The number of institutions you know of providing e-Learning at national level:

(a) 1-3 [ ] (b) 4-7 [ ]

(c) More than seven [ ] (d) None [ ]

Please mention few.....

.....

4. The number of institutions you know of providing e-Learning at International level:

(a) 1-3 [ ] (b) 4-7 [ ]

(c) More than seven [ ] (d) None [ ]

Please mention few.....

.....

5. You have participated in any formal training programme on e-learning or e-Resource creation:

(a) Yes [ ] (b) No [ ]

If Yes, please give the details .....

.....

6. You consider the implementation of e-Learning system is important in LIS education in India:

(a) Extremely important [ ] (b) Very important [ ]

(c) Neutral [ ] (d) Very Unimportant [ ]

(e) Extremely Unimportant [ ]

7. The category of software you suggest to create e-learning resources in LIS education:

(a) Open source software [ ] (b) Proprietary [ ]

(c) In-house developed [ ] (d) Commercial [ ]

(e) Not applicable [ ]

Please name few types of software and specify the reason behind selecting the above mentioned software

....

....

....

8. The type of infrastructure you feel provides the most versatile solution for delivering online learning:

(a) Web-site based (b) Portal based

(c) E-mail based (d) Dial-up based

(e) Other, please specify _____

9. The infrastructure designs which offer the most versatile learning delivery system:

(a) Proprietary in-house hosting

(b) CD-ROM distribution

(c) Video conferencing

(d) Third party hosting

(e) Other, please specify _____

10. The following technique you think is the most effective for developing e-Learning modules?

(a) Create a web-site

(b) Custom software development

(c) Use an existing software package

(d) Use an E-Learning hosting service

11. The most effective means of knowledge transfer you think in electronic environment is:

(a) Classroom learning

(b) CBT on CD-ROM (CBT=computer-based training)

(c) Web-based learning

(d) Video conferencing

(e) Other, please specify _____

12. The most critical component of a web-based E-Learning delivery system in your opinion (Multiple selections are permitted):

(a) Security

(b) Availability

(c) Scalability

(d) Accessibility

(e) Cost

13. The different ways that are effective in communicating with students in online courses (Multiple selections are permitted):
    (a) E-mails
    (b) Study guides
    (c) Social networking
    (d) Phone calls
    (e) Audio/Video conferencing
14. The strategies you think are effective in assessing what students are learning from online instruction:
    (a) Essays
    (b) Projects
    (c) Multiple-choice tests
    (d) Assignments
    (e) Tracking and seeing how they respond to your feedback
15. The techniques you can use to keep students motivated to progress through your course (Multiple selections are permitted):
    (a) Listen more and stay tuned into the course
    (b) Allow opportunity to redo an assignment to meet expectations
    (c) Providing time and opportunity to review
    (d) To keep a time-line to check their progress
    (e) Immediate responses and feedback
16. Do you agree, Internet is reliable enough to provide 24/7 delivery of learning?
    (a) Strongly Agree [ ] (b) Agree [ ] (c) Neutral [ ]
    (d) Disagree [ ] (e) Strongly Disagree [ ]
17. Do you think, the application of e-learning system would replace or substitute the traditional classroom teaching?
    (a) Yes [ ] (b) No [ ] (c) Can't Say [ ]
18. Do you believe, third party providers or outsourcers are a safe and reliable means of providing learning?
    (a) Yes [ ] (b) No [ ] (c) Can't Say [ ]
19. Do you believe, properly implemented human computer interfaces are important to a favourable user experience?
    (a) Yes [ ] (b) No [ ] (c) Can't Say [ ]

20. The features, you feel must be present in an e-learning system (Multiple selections are permitted):

☐	User friendly Menus	☐	Tools for threaded discussions
☐	Communication tools	☐	Detailed syllabus
☐	Additional enrichment	☐	Interactive learning activities
☐	Message boards	☐	Status reports of student's progress
☐	Navigation options	☐	Study guidelines
☐	Tools for posting media online	☐	Downloadable audio/video lectures
☐	Online chats/ Social Networking	☐	Course events and forums
☐	Ask a teacher	☐	Feedback options

21. Please encircle the appropriate number to indicate your agreement or disagreement with your expectations out of e-learning:

1=Strongly Agree (SA) **2**=Agree (A) **3**=Neutral (N)
4=Disagree (D) **5**=Strongly Disagree (SD)

	SA	A	N	D	SD
(a) E-learning enhance the reach and quality of LIS education:	1	2	3	4	5
(b) The use of e-learning creates better interaction between teacher and students:	1	2	3	4	5
(c) The application of e-learning makes the course more interesting & vivid:	1	2	3	4	5
(d) E-learning provides a better learning Experience:	1	2	3	4	5
(e) E-mail and other internet tools are very effective means of communication utilized for academic and research purpose.	1	2	3	4	5

22. Please provide any comments or suggestions about e- learning development, delivery, content, or anything else you feel is important.

_____
_____
_____
_____
_____

Thanks for your valuable response

APPENDIX - II

Department of Library and Information Science
Aligarh Muslim University
Aligarh-202002
(Questionnaire for E-learning Proficient Staff and Students)

Dear Staff Members/Students,

I am a doctoral student in Library and Information Science under the propitious supervision of ***Dr. Naushad Ali P.M., Associate Professor, DLIS, AMU*** and I am currently working on my dissertation entitled ***"Design and Development of E-Learning Solutions in Library and Information Science."*** I am conducting this study to better understand how to improve online instruction and the necessary components to be incorporated in the designing of an E-Learning System. This will entail your completion of the questionnaire which is expected to take 5-10 minutes to complete. Your participation is solicited and your information will be kept highly confidential.

Sincerely,

Sheikh Mohd Imran
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Name: _____

Organization: _____

Gender: [ ] Male [ ] Female

Category: [ ] Staff Member [ ] Student

Qualification: [ ] Graduate [ ] Post Graduate [ ] M. Phil [ ] Ph.D

Specialization (If any): _____

Current Position: _____

1. For how long you have been involved in online learning and training
   (a) Less than 1 year (b) 1-2 years
   (c) 3-5 Years (d) More than 5 years
2. How much effective do you find e-learning in today's ICT era
   (a) Very much effective (b) Effective
   (c) Average (d) Poor

3. You believe that e-learning proves successful for the organizations to improve their learning and outreach

(a) Yes [ ] (b) No [ ]

4. According to you, the physical location of individuals requiring learning must be

(a) One central location

(b) Primarily at their homes or offices as per convenience

(c) Widely distributed in many geographically diverse offices

(d) No or few fixed locations, primarily mobile

5. The delivery of learning in an organization must mainly be

(a) Classroom learning [ ] (b) Blended learning [ ]

(c) Purely Online [ ] (d) Self study only [ ]

(e) Other, please specify _____

6. The frequency of learning performed in an organization must be

(a) Annually [ ] (b) Quarterly [ ]

(c) Monthly [ ] (d) More frequently than monthly [ ]

7. The number of staff members that you feel are required for providing effective online learning and training:

(a) 1-3 [ ] (b) 4-7 [ ]

(c) 8-10 [ ] (d) More than 10 [ ]

8. Staff members should mostly include:

(a) Subject experts

(b) Computer experts

(c) Technical experts

(d) E-learning experts from outside the organization

(e) All of the above

9. The different ways, you believe are effective in communicating in online courses (Multiple answers are permitted):

(a) E-mail is far and away the most effective

(b) Comments

(c) Social networking

(d) Allow phone calls

(e) Tracking changes on all feedback

10. The learning feedback regarding the individuals receiving learning should mainly focus on:

(a) Efficiency of the web-portal
(b) Learning delivery methods
(c) Instructor competence
(d) Value of course to individual
(e) Suggestions on improving learning

11. The strategies to be effective in assessing what students are learning from the online instruction must include (Multiple answers are permitted)?

(a) Essays, projects or other products (b) Short answers
(c) Essay questions (d) Multiple choice tests
(b) Assignments and Activities

12. You believe that learning is developed and delivered fast enough to be relevant in you:

(a) Yes [ ] (b) No [ ]

13. Do you think the application of e-learning system would replace or substitute the traditional classroom teaching?

(a) Yes [ ] (b) No [ ] (c) Cannot say [ ]

14. Do you think the application of e-learning system would cause to weaken the student faculty relationship?

(a) Yes [ ] (b) No [ ] (c) Cannot say [ ]

15. Are there any reasons why e-learning would not work for some or all of your learning needs?

(a) Material/Content is complex
(b) Hands on practice is required
(c) Lack of infrastructure and expertise
(d) Lack of face-to-face interaction
(e) Complex user interface and learning system
(f) Other, please specify _____

16. Are you facing any problem in the application and use of e-learning resources?

(a) Yes [ ] (b) No [ ]

If yes, Please specify _____

_____

17. Use of e-learning resources in your subject is mainly

(a) To improve the quality of traditional education [ ]

(b) To improve the quality of teacher-student interaction [ ]

(c) To expand the scope of LIS education [ ]

(d) To innovate in teaching and learning [ ]

18. Obstacles in using e-learning resources in teaching and learning process

(a) Insufficient ICT know-how [ ]

(b) Inadequate infrastructure (Hardware and Software) [ ]

(c) Lack of training programme [ ]

(d) Lack of time [ ]

19. The features which are there in your e-learning system (Multiple answers are permitted):

☐	User friendly Menus	☐	Tools for threaded discussions
☐	Communication tools	☐	Detailed syllabus
☐	Additional enrichment	☐	Interactive learning activities
☐	Message boards	☐	Status reports of student's progress
☐	Navigation options	☐	Study guidelines
☐	Tools for posting media online	☐	Downloadable audio/video lectures
☐	Online chats/ Social Networking	☐	Course events and forums
☐	Ask a teacher	☐	Feedback options

Any other, Please specify _____

20. According to you, what are the other features to be included in your existing e-learning system?

(a)	News and Events	(b)	Users Count
(c)	Standards Compliance	(d)	References
(e)	Graphics	(f)	Site Search
(g)	Web 2.0 Items		

Any other, Please specify_____

21. Please rate each item on a five point scale that reflects your personal preferences as follows:

5 (Strongly Agree) - you absolutely prefer this item;

4 (Agree) - you value the feature but it is not essential;

3 (Neutral) - you have no preference one way of the other;

2 (Disagree) - you do not value the feature reflected in the item;

1 (Strongly Disagree) - you definitely would not use the feature.

Online courses should be designed to:

1. Allow all students to work independently at their own pace.

[ ] Strongly Agree [ ] Agree
[ ] Neutral [ ] Disagree
[ ] Strongly Disagree

2. Provide an explicit orientation to the course structure and requirements.

[ ] Strongly Agree [ ] Agree
[ ] Neutral [ ] Disagree
[ ] Strongly Disagree

3. Allow easily access to any part of the course.

[ ] Strongly Agree [ ] Agree
[ ] Neutral [ ] Disagree
[ ] Strongly Disagree

4. Allow students to easily communicate with other students.

[ ] Strongly Agree [ ] Agree
[ ] Neutral [ ] Disagree
[ ] Strongly Disagree

5. Provide discussion opportunities related to the content.

[ ] Strongly Agree [ ] Agree
[ ] Neutral [ ] Disagree
[ ] Strongly Disagree

6. Involve students in reviewing the work of other students online

[ ] Strongly Agree [ ] Agree
[ ] Neutral [ ] Disagree
[ ] Strongly Disagree

21. Please provide any comments or suggestions about e-learning development, delivery, or anything else you feel is important

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Thanks for Your Cooperation